RAILWAY MODELLING IN MINIATURE

A PRACTICAL HANDBOOK ON THE PLANNING, BUILDING AND OPERATING OF MINIATURE RAILWAYS, WITH SPECIAL REFERENCE TO "OO" AND "HO" GAUGES

BY

EDWARD BEAL

Fully illustrated with dimensioned drawings, sketches and actual photographs of miniature railways

With Forewords by

PERCIVAL MARSHALL, C.I.Mech.E.,
AND
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THIRD EDITION

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FOREWORD TO FIRST EDITION

THERE is no more fascinating hobby than that of building and operating working railways in miniature. It affords endless scope for neat craftsmanship in the construction of locomotives, rolling stock, stations, bridges, and line-side accessories ; it appeals to the artistic sense in its requirements of realistic scenic settings, and it provides both entertaining and instructive problems in the marshalling of trains and running them to a time-table. As will be seen from the photographs in this book, the modern miniature railway is very much more than a toy. When locomotives and rolling stock are correctly modelled to scale to represent prototypes on real railways, and when the permanent way is correctly laid and the line properly signalled, all the operations of a real railway system can be carried out in miniature. Naturally the desire to plan and equip a miniature railway correctly leads to a close study of real railway practice, and for this reason the hobby not only has a distinct educational value, but provides its devotee with numberless opportunities for profitable observation of railway equipment and methods, when on his travels. A good miniature railway is never finished ; there is always something to be done in the way of improvement or extension, of adding new rolling stock, or in some way developing the interest or appearance of the system. It affords endless occupation and enjoyment.

Miniature railways vary very much in their size and motive power. There are many garden railways with powerful steam locomotives capable of hauling a train-load of a dozen or more real passengers. Smaller outdoor railways, using steam or electricity for their motive power, give ample opportunity for the laying of an interesting track round lawns, or through orchards, or rockeries, with bridges to be crossed or tunnels to be passed through. But the majority of miniature railways are to be found indoors, a convenient room or attic being set aside for the purpose, so that the railway may be installed and remain in situ *undisturbed, and protected from the weather.*

Here we come to the object of this book : it is to aid the miniature-railway enthusiast who, for reasons of restricted space, is unable to put down a layout in one of the larger gauges. Mr. Edward Beal, the author, writes especially for the railway modeller in miniature, who adopts what is known as Five-eighths-gauge. Interest in this small-scale modelling is spreading rapidly, partly because the general public is becoming more appreciative of the attractions of the hobby, but mainly because the enterprise of the model-railway manufacturing firms has made the necessary equipment and accessories available on a less expensive basis, and in a much more varied and improved range. This diminutive scale makes it possible for the owner of a small house, or even a flat, to put down a most attractive miniature railway system in a comparatively small space, and to get all the thrills and interesting complications of a larger railway requiring a whole room for its installation.

Mr. Beal is himself a real miniature-railway builder and owner, and a profound student of real railway practice in all its aspects. He has for many years past contributed regularly to The Model Railway News *and has earned world-wide recognition as a practical exponent of the hobby. He is gifted with both imagination and artistic ability, and an examination of the hundreds of drawings and sketches in this book from his own pen, and of the photographs of his own realistic railway, will show how faithfully he puts his own instructions into practice. Moreover, his many designs will serve as an inspiration both to newcomers to the hobby and to owners of existing systems, to make their miniature railways not only pleasingly spectacular in appearance, but admirably representative of the real railway world.*

PERCIVAL MARSHALL.

FOREWORD TO THIRD EDITION

BUT for the catastrophic upheaval caused by the world war, the third edition of this book would probably have appeared years ago. Interest in railway modelling had not only spread itself far and wide, but was growing rapidly when the war broke out. Contrary to the expectations of most of us, that interest continued to grow during the lean years which followed 1939, *in spite of the fact that traders who normally catered for the hobby practically ceased to function in that capacity. In the meantime, however, considerable thought has been given to the preparations for ensuring the future progress and development of the hobby.*

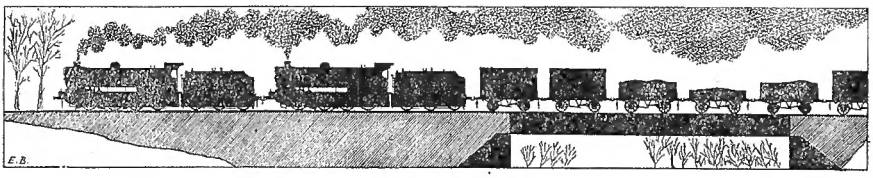
Now, with the prospect of brighter times before us, the necessity has once more arisen for a comprehensive and popular guide-book to meet the needs of the many newcomers to model railway engineering : and what could be more suitable than this book, revised and brought up to date ? Mr. Beal requires no introduction : he is widely known as a practical railway modeller with plenty of experience and a happy knack of imparting his enthusiasm and profound knowledge to others, but in an informative manner which is readily appreciated and assimilated by all readers, no matter what their ages may be.

It is necessary, once and for all, to dispel the idea that railway modelling consists merely of "playing trains." Enthusiasm for railways should be definitely encouraged in young people and respectfully admired in their elders : and a practical interest in miniature railways gives each one of us the opportunity to indulge in one of the very few hobbies which are, at once, healthy, amusing, instructive, constructive and profitable.

In support of this assertion, no better evidence than Mr. Beal's treatment of the subject, as set out in the following pages, could be found.

J. N. MASKELYNE.

SUBJECTS AND CONTENTS



CHAPTER I

MERITS OF THE SCALE

AS will generally be known by all interested persons, there were two scale standards in railway modelling which adopted the track-gauge originally known as " five-eighths-inch." They are technically named HO-gauge and OO-gauge respectively. Into the vexed question of the relationship of these two standards it is not intended to enter deeply in this book. OO-gauge was the first in the field with standardised components and fittings, and the main reason for its adoption of the scale of 4 mm. to 1 ft. was in order to increase the body proportions of rolling stock to suit what then seemed to be a necessary wheel heaviness. Immediately after its introduction, one enterprising London manufacturer placed on the market wheels of a much more accurate size, and was thereby able to retain the more strictly correct scale of $3\frac{1}{2}$ mm., known as HO (or half-O). Unfortunately, a considerable number of enthusiasts had already devoted themselves to the OO standard and did not at the time find it possible to change over. A sporting warfare has been waged ever since around the subject of the prior claims of the one standard or the other. In the writer's opinion there is no question about it whatever, though he himself adheres to the 4-mm. size. The smaller standard is obviously the more technically in order, and is to be preferred in theory, but manufacturers have to serve a public long ago pledged to OO-gauge by cheaper costs and more plentiful commercial service. The difference is so minute as to appeal only to those who are rather pedantic upon the subject of scale accuracy, and who look upon " scale " as a matter of moral integrity rather than one of convincing appearance and realism. It is far too late in the day to hope to change definitely to the one or the other. The beginner must simply decide for himself which standard to follow, after a careful perusal of the various manufacturers' lists showing what provision is made for the two sizes; and between the advocates of each standard a spirit of co-operation is far better than one of contention and argument.

Since the last edition of this handbook there has been created the British Railway Modelling Standards Bureau (B.R.M.S.B.), which has laid down some useful rules and regulations for all the smaller scales ranging from O-gauge downwards. Wheels, track, rail, sleepers for HO-, OO- and O-gauges have already been regularised and the resultant dimensions published, and there is every sign that after the war the manufacturers will be prepared to work, so far as it comes within their orbit, to these rules. For OO-gauge two distinct standards have been set up, known as the " Standard OO " (4-mm. scale and 16.5-mm. gauge) and " Scale OO " (4-mm. scale and 18-mm. gauge). Similarly, for O-gauge there are two

distinct categories, the " Fine Standard " and the " Coarse Standard." The scales for both are 7 mm., and the gauge 32 mm. HO-gauge has retained a place of its own, being at all events consistently accurate. Doubtless, in due course, 18-mm. gauge (Scale OO) will be included by many manufacturers in their standard equipment and service. Untrammelled scope has also been fortunately left for those who are already committed to the former (now the Standard OO) dimensions. The fixing of these standards was an urgent matter, and it is excellent not only that it has been taken in hand at last, but that other principles and dimensions are likely to be set up as exclusively authoritative. This will bring to an end the despair with which many a beginner has been overcome when he has found that one firm's wheels would not run on the track required by the wheels of another firm, and so forth.

It may be stated that throughout this book the dimensions given for buildings and all other equipment, apart from track and rolling stock, apply to both standards in OO-gauge, while rolling stock and track come under the heading of " Standard OO-gauge."

A matter of some importance is that of the increasing popularity and deserved preference of these small standards over all the larger gauges formerly espoused for indoor railway modelling. There are two definitely distinct orders of interest in this work. First there are those workers who wish to build minutely accurate models of individual items of railway equipment. Then there are others who wish to build a model of a railway in all its parts, with sections of fully equipped and realistic permanent way, with locomotive depots and freight yards and passenger terminals complete. It follows without discussion that for the second group *the smaller the scale the better,* so long as perfect working conditions and locomotive haulage power are to be secured within its limits. What they desire is a comprehensive " bird's-eye " section of a real system on which trains may be run to organised time-table. They evidently caught their interest in railway traffic working on some occasion in the past when they looked down from a hill-top upon a stretch of landscape and saw a great dock, a country station, or a complicated city terminus, with trains moving in all directions, and wanted to " reach out and run the trains " themselves. In a manner of speaking, that is exactly what these smaller scale dimensions enable one to do.

If you build a railway depot in these smaller standards you can have proper platforms, 5 to 8 ft. long ; with scale-length trains of ten coaches ; you can run refrigerator vans to and from cold storages ; fruit vans can work between country stations and preserve factories ; coal wagons can run from pit to mill or dockside ; timber wagons can run between forests and sawmills. You can have shunting yards as in real practice. Your running shed for locomotives can have six tracks and house a dozen engines. You can include proper coaling and watering plant.

And in order to secure these advantages, you need only the amount of space which a plain circle of track in O-gauge would demand. An OO- or HO-gauge layout requires one-quarter the area occupied by the same layout in O-gauge. In order to illustrate these facts I have selected photos of the West Midland Railway (OO-gauge).

Then there is the matter of transport and convenience. Many men interested in railway modelling are engaged in professions which involve periodic removals and settlement in temporary quarters. With these smaller models, removal and package is a much more convenient procedure. A model locomotive of the " Pacific " tender type goes into a box a foot long. Buildings are light and portable. A model oil tanker fits into a tea-box. Labour-saving houses have smaller rooms, and large spaces for layouts are in these days hard to come by. Costs are very much lower : you can buy a complete layout, or, what is much better, the materials for building one, at the price of a first-rate super-detail O-gauge locomotive. Track can be had comparatively cheaply when bought for a layout to be built up at home, and the cost of other components is in proportion. It used to be possible to argue that the range of parts and fittings was badly restricted, but this is no longer true. It is now possible to buy at the most modest prices all that the amateur could desire—mechanisms, wheels of all varieties, lithographed building papers to simulate brickwork, stonework, and timber, lithographed coach and wagon sides in great variety, wooden coach and wagon parts, metal wagon components and chassis, locomotive fittings, and in fact everything in the most fascinating profusion.

There are not many persons who have access to a workshop in which to do their model constructing. What they desire is to work to a scale that is suited to a study table in the evenings, for they have neither a bench, a lathe, nor very many tools. This is not to say that these small standards offer any temptation to flimsy or slipshod workmanship. You can carry out a really good engineering job in HO-gauge as well as in 1-gauge, if you are aiming at sound work. And, similarly, it is just as possible to secure perfect running and haulage to these standards if the work is done carefully. One commonly meets with beginners who find that their first efforts at track-making or coupler-fitting do not give entire satisfaction, and who immediately conclude that " good running " is not possible in such a small scale. There could be no greater mistake. If track is laid with only reasonable care, and if couplers and wheels are fitted similarly, passenger trains will resolutely keep the rails at a scale speed of about 180 miles per hour. Locomotives can be built from standard mechanisms which will haul twenty wagons up a 1 in 45 gradient of any length. Goods mechanisms can be had with specially low gearing for main line or shunting work, so that engines can be made to move at a scale equivalent of about 4 miles per hour. A practically infallible automatic uncoupler is now on the market by means of which both simple and fly shunting can be perfectly carried out.

In Fig. 1 the general dimensions for HO and OO scales are given, the former being incorporated within brackets. No slavish code has been followed in either standard, practical experience rather having been the sole guide. But these dimensions will be found, I think, sufficiently reliable and correct. For many readers who follow O-gauge standards the including of separate scales with all the designs given will be found a convenience, as O-gauge dimensions can immediately

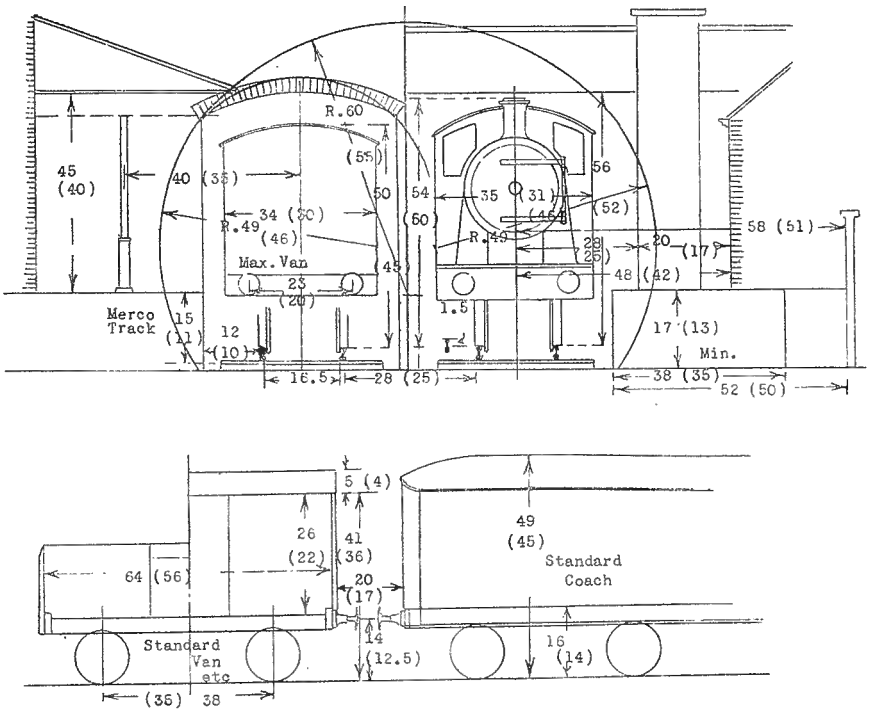
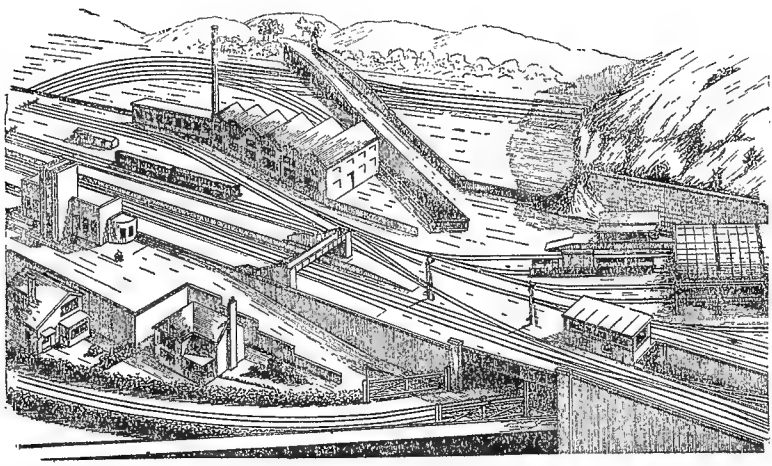


Fig. 1.—Approximate leading dimensions for OO- and HO-gauges.
(Dimensions for HO-gauge in brackets.)

be ascertained by merely doubling those given for HO. In including layout plans, these have been so designed as to be suitable for either standard ; but if minuteness is desired, the difference between low and high levels may be slightly reduced for HO scale. The writer has endeavoured to incorporate every kind of ingenious improvisation within his knowledge so that the hobby may be carried out at a minimum of expenditure.

MERITS OF THE SCALE

There can be no manner of doubt that for railway modelling within the somewhat stern space-restrictions of modern homes where the utmost available area will probably be a garage or a spare bedroom of nominal size, the future lies with the small-scale standards to be dealt with in this book. This is not to cast a slur on any of the larger gauges. HO and OO have their definite limitations, for they are totally unsuited to outdoor construction. That is the sphere for O- or 1-gauge. But where there are ten people so privileged as to have the vacant space or the available cash to build one of these latter layouts, there are a hundred who, if they are interested in the most fascinating subject of railway modelling at all, will be glad—it is hoped—to read these pages.



Aerial sketch of Laurenceton station and surroundings.
(West Midland Lines, 1942).

CHAPTER II

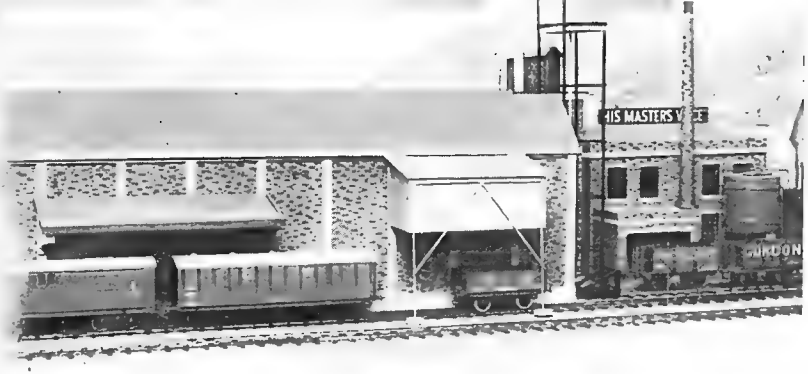
TRACK WORK AND LAYOUT DESIGN

THE first word of sound advice to be given to the beginner is that he shall *make a start*. There are enthusiasts who never get beyond the paper stage of the hobby, and who, therefore, have no real notion of the meaning and interest behind it. They draw plans, write letters, read magazines, and belong to clubs, perhaps, but at best they are theorists only. This is sometimes inevitable by reason of a lack of available site and so forth, but more often it is a mild sort of vice which tends to make its victims odious to practical workers : and certainly those who do not actually make models can say little to help materially in the labours of other enthusiasts who are actually learning by experience. If you have no available space for a layout, why not make rolling stock and motive power against the time which will come when you will have the space ?

Another strange foible of the starter is that of looking too far ahead—so far ahead that he never really gets going. When working or proposing to work in " five-eighths-gauge " it is good to bear in mind that it matters little if you do things entirely wrong : it is just as good fun rebuilding a layout as it is to construct it in the first instance. The author's late West Midland System had been a continuous development, as all actual systems are. No civil engineers who plan real railway routes do so with the aim in view that nothing shall be altered or thought out afresh. They get trains running by the most expeditious route and on the most reliable track they can at first make. And while it is all very well to plan a model line with a view to future developments, it is another matter if the constructor toys with twenty different ideas for two years, and then, through sheer lassitude and nausea of theory, throws up the sponge.

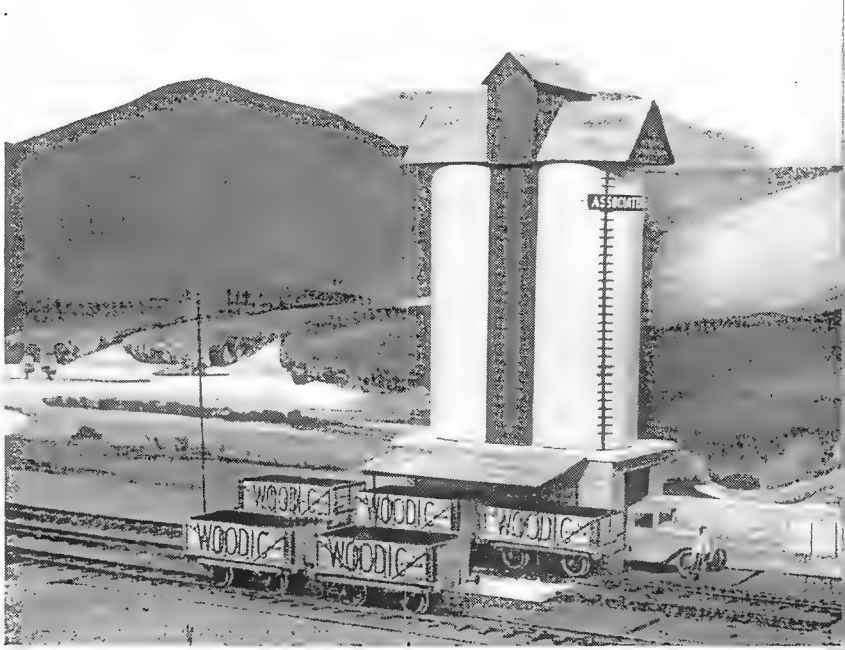
One dwells in brief on these facts because there are, unavoidably, a large number of questions which *have* to be settled before work may really begin, and these are enough to occupy the time one may use before beginning. It is assumed that those who read these lines have already decided on one or the other of the " five-eighths " standards. The next matter, after securing a site, is to fix upon the particular type of layout. Here are some of the alternatives :—

Portable or permanent.
Point to point or continuous.
Single or double track.
Reverse train or loop-line.
Branch lines or none.
Single system or related companies.
Single level or multiple level.

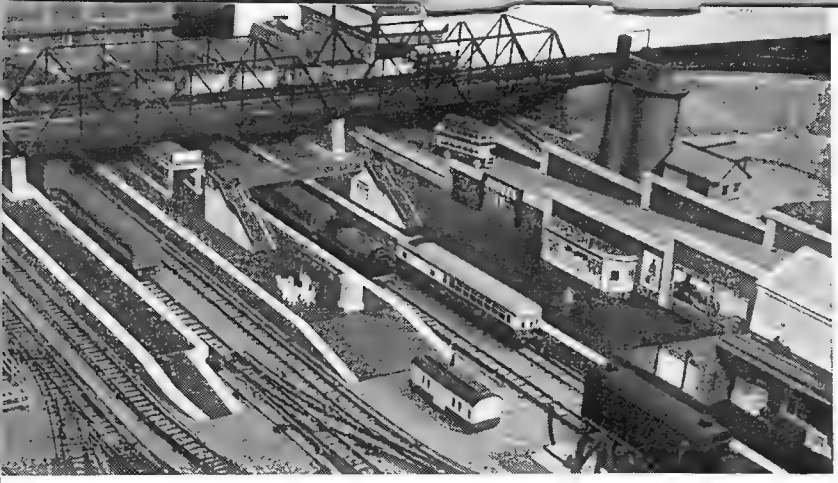


Model H.M.V. factory (OO-gauge).

House-construction site at Methven.



Retail coal pocket (OO-gauge).



Laurenceton Old Terminus (West Midland Railway), showing spacial capacity of OO-gauge. The old rail-built viaduct is shown.

The first station ever built on the West Midland Railway—Wattletops (1932).

One of the station buildings on the lay-out of Capt. Fleetwood-Shawe. OO-gauge "Shire" class loco. in foreground. The station clock is an actual timepiece.

Portable layouts can be admirably arranged in these standards. A friend of mine who is an Air-Vice-Marshal in the Royal Air Force has devised a most excellent portable scheme (Fig. 2) whereby a comparatively elaborate layout can be dismantled and packed for transit by two workers in an hour. On the other hand, a permanent structure can be so arranged as to be readily dismantled for transport in a day or two. Some enthusiasts greatly object to the idea of incorporating a

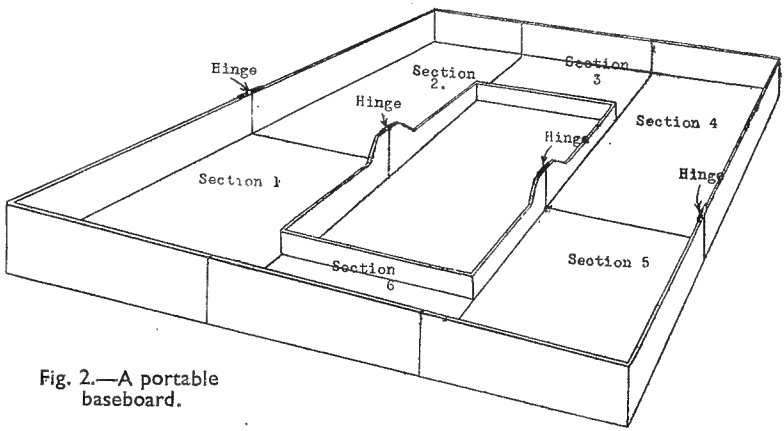


Fig. 2.—A portable baseboard.

continuous run in a layout on the ground that this is not in strict accordance with real procedure. But on the other hand it is good to remember that in real procedure a railway is never laid in a room or garage ; and a continuous run is a boon in many ways for time-table working, as trains may be made to take as long or as short a time as necessary over a journey, and an opportunity is provided to see trains really operating over a long journey. *Single track* is also frequently despised, yet there are thousands of miles of actual railway of this order, and single track in a model system makes always for the most desirable feature of " length of run," avoiding at the same time much complicated point insulation and circuit confusion. *A loop* at the end of a layout may easily be concealed behind a deep cutting, false background, or tunnel, and is an excellent expedient for utilising up and down roads properly without reversing trains. It may also serve admirably as a link whereby a point-to-point layout is made continuous. To have two or more *related companies* is a very attractive procedure with a view to running varied rolling stock and locomotives, and for arranging transfer of through coaches and so on. The question of *how many levels* to adopt depends greatly on the size of site ; but while it is true that, with more than one level, gradient problems are at once introduced, it is also true that many very attractive engineering and bridge problems will also

be brought into being by having more than one level. The beginner must form his own decision upon these vital subjects before adopting his plan. Fig. 3 shows clearly some of these simple alternatives. Model layout planning is something more than a merely haphazard disposal of tracks. Manufacturers like Stewart-Reidpath, of Herne Bay, Kent, Mr. Mellor, of North Wales, or Mr. Hambling, of London, as well as other accredited persons, are willing to prepare plans for a nominal fee.

Let us consider some of the interesting determinants of actual terminal planning, dealing in the first place with passenger stations. A passenger station is never located in a hollow at the foot of two gradients unless unavoidable, as this would tend to difficulty in starting trains and controlling incoming vehicles : and although this is often a negligible matter in a model layout, certainly no model station should be placed on an incline. Real coaches will start themselves running on a gradient of 1 in 300, and model coaches have the same tendency. Stations are arranged with a special view to the type of traffic they are to deal with, and, where possible, space is left for extension. Between the platforms and booking hall there should be no stairways, but rather easy slopes, so that luggage can be moved about and passengers may have good access. In large stations there should be provision for a road-motor rank at the main arrival platform. For suburban trains there may be docks or bays, which often give access to both sides of the train at once. In model practice, platforms should always be as lengthy as possible. For our chosen standards, never make platforms shorter than the length of the normal train to be run : 5 to 6 ft. is sound. Stations are either through or terminal, or may adopt a combination of both. Tracks are generally placed in pairs between platforms. Occasionally a single platform of the " island " type is set between a pair of up and down tracks, or a loop. Most platforms are at the approximate height of coach floors, but there are variants of this rule, and not infrequently the platform height is even a foot lower than the lower length of coach step.

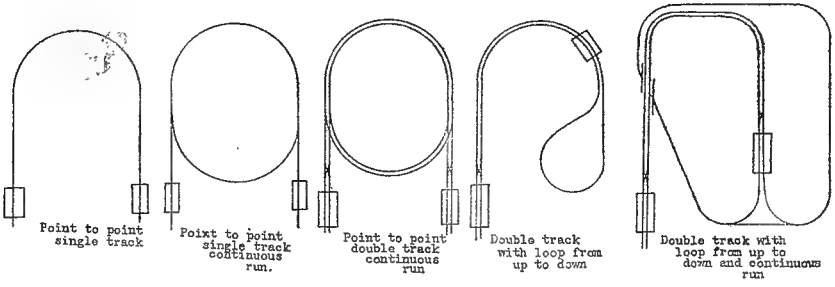


Fig. 3.—Possible layout schemes.

A vital feature is the track approach to a passenger station. The aim must be to link up the main line with the station roads so that any train may pass from any track to another without, if possible, fouling the main-line approaches to other tracks. Provision is also made for alternative routes in the event of one or other road being temporarily out of use. Trains must also be able to leave and to arrive at the same time, and this without any shunting movements, unless on occasion there is need for a single reverse to get from a branch-line approach into the station itself, and this is very unusual. At the entrance to a double-track station, there will usually be placed a pair of crossovers in opposite directions, and in order to save space, these are sometimes superimposed upon each other to form a scissors crossing (Fig. 4). Slip-points are by no means impossible in " five-eighths-gauge," though they require to be very carefully made. There are many instances of such points in operation on OO- and HO-gauge layouts. It is extremely important on all layouts of passenger stations to provide ample coach sidings for the storage of vehicles, and this rule applies also to goods stock. Nothing is more irritating than to have no place in which to store away vehicles when not in use, or to be restricted to two or three coaches for lack of storage space.

Locomotive yards are absolutely essential on a model layout despite the fact that engines require neither food nor drink. Such a depot includes a running shed (or covered building for housing engines), a coal stage, a water tank with supply pipes for serving engines, ashpits between one or more approach tracks for the discharge of dead cinders, and other refinements such as locomotive shears for lifting engines wholly or partially off the rails, a fire-kindling furnace in which a fire is kept burning from which to light the fires of engines prior to raising steam, and various lobbies and hutments peculiar to such sites. Running sheds may take the form of a long or quare erection with parallel tracks, or that of the circular house with turntable in the centre. The latter method is rare in Britain, owing to the fact that a turntable exit involves risk of delay because of possible disabling of the mechanism. Such sheds, where they exist, are rapidly being replaced by parallel-track sheds. Coaling is carried out in various ways, and the covered hoists or platforms for this task vary from a tiny raised floor alongside a truck siding to a huge concrete wagon hoist and tipple, the type depending on the amount of traffic. Your coaling plant should suit the size of your running shed. The track approach to an engine depot should, if possible, be placed just in front of the departure tracks of the station, with a trailing, not a facing, crossover, and so that engine movements interfere with train movements as little as possible. The inclusion of a proper locomotive depot is essential, of course, for the correct time-table operations, which should always be in the mind of the constructor. All parts of the depot should be readily accessible to the hand of the operator, and it is interesting, where practicable, to provide a good length of open track for the ready

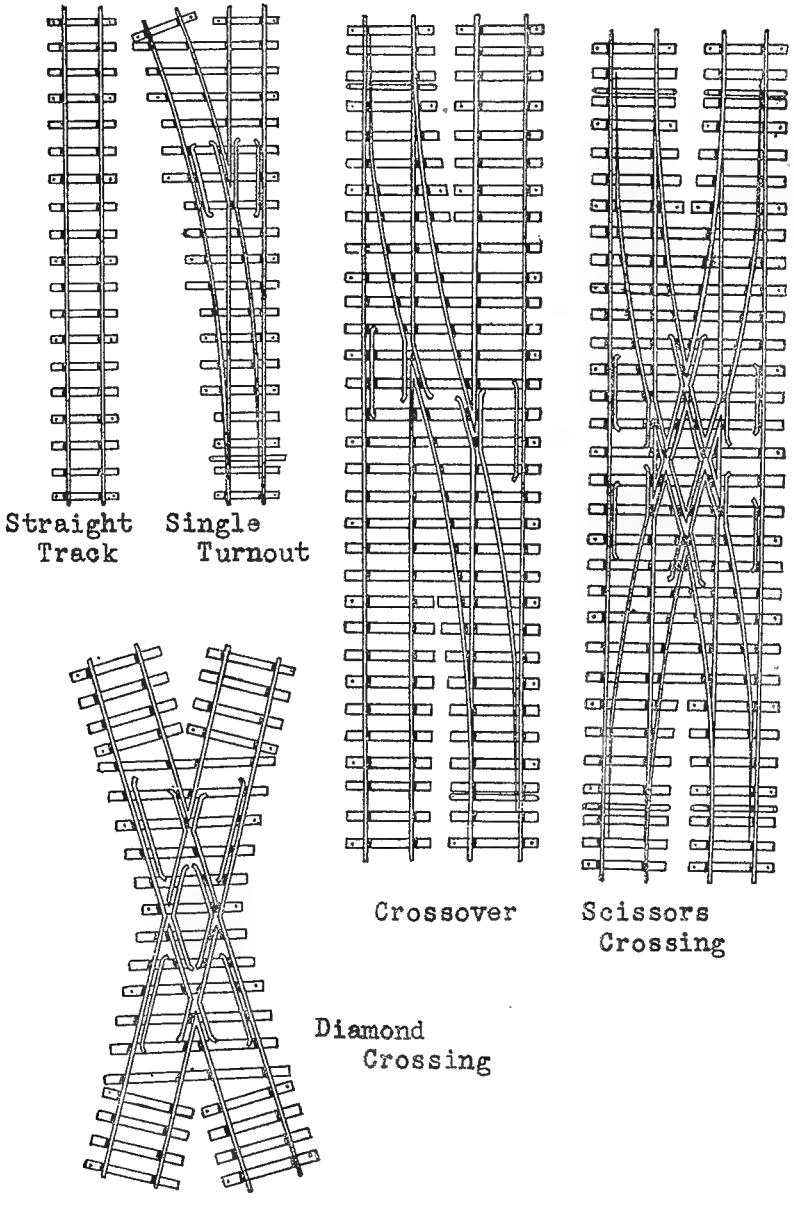


Fig. 4.—Standard points and track.

display of the engine stud. If possible, get the main source of light for the room to fall right in front of the running shed.

Goods yards are too complex to discuss at great length in our very restricted space. But there must definitely always be a separate arrival track for trains and an independent track, if possible, for running the train up and down for shunting. The arrival track may, if necessary, cover one or two of the siding entrances, so long as the arrival leaves a clear way of access to the first siding, into which a part of the train may at once be shunted and the rest of the length thereby be shortened.

A few additional precautions should also be observed in designing layouts. At a passenger terminus, always provide some means of separating a newly-arrived train from its engine and for the attaching of a departure engine to the other end. This is possible by means of a crossover of the trailing type at a point on the arrival line just behind the engine, which may thereby run around its train. But if there is plenty of engine power at disposal, this is not at all necessary. The method of Fig. 5 may be followed instead. Here the arrival platform is in two

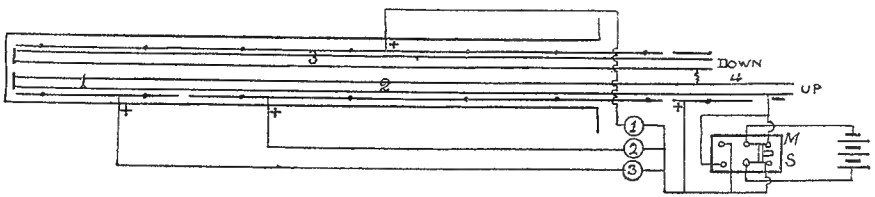


Fig. 5.—Avoiding crossovers at terminal platforms by sectional wiring.

separate electrical sections, so that the arrival engine may be held stationary whilst the departure engine is run on to the other end, the arrival engine leaving for the depot after the train has left the road. Never build a tunnel without providing means for clear access in case of derailment or stoppage trouble, and never allow a tunnel to cover any kind of a point. Lay track in yard lengths, wherever possible, to avoid rail joints. Make all curves to a minimum radius of 24 in., measured to the outer rail. Avoid gradients steeper than 1 in 50, and make them much more gradual if you can. Finally, consult Fig. 6, which gives details of common mistakes in track planning.

The first requirement, of course, will be a suitable baseboard on which to lay the track. The simplest known to the writer is that shown in Fig. 7, which was employed in the West Midland structure. It consisted of plain rectangular supports made separately and all of precisely the same height, the top width varying with the baseboard width—two, three, or five floorboards wide. These trusses were placed under the baseboard, which consisted of a pulpwood known as " Treetex,"

obtained in solid sheets. The whole of one side of the room was boarded in single lengths and the trusses screwed to the "Treetex" at intervals of about 3 ft. The fitted baseboard held the table rigid against the outer walls, and the bases of the supports were attached to the floor by small metal brackets as shown. For an island baseboard, in the middle of a room, more brackets were introduced at the loose end.

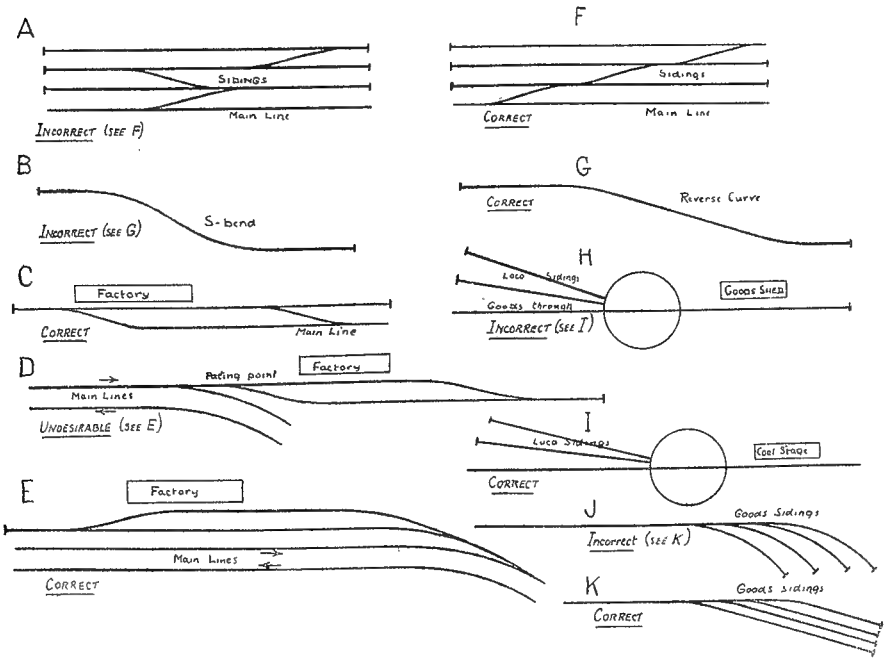


Fig. 6.—Correct and incorrect rail-planning.

After fitting the baseboard, which should be scrupulously even at every point of its surface, the gradient supports should be erected. These may be made of floorboard or of ½-in. planed wood, and should be 2 in. minimum width for single track and 4 in. for double track. The planks are supported by wooden blocks at suitable intervals, into which the running board is screwed, the blocks being screwed to the baseboard first from underneath. Where the gradient takes a curve, I suggest that a local joiner be commissioned to make shaped pieces of ½-in. thick plywood to take the curve. The lower end of the running board should, of course, be tapered off very gradually to a feather-edge to bring the rails to track lower level. The size of these shaped curves (Fig. 9) will vary with the radius of the curve. In *dropping* a gradient from the main level, the same method may be employed, metal

brackets made of Meccano strip being substituted for the supporting blocks. Leave sufficient width space on the brackets to allow for the insertion of retaining walls in wood or other material. Gradients involve cuttings, embankment facings, and bridges, as well as retaining walls. Fig. 10 gives a simple and satisfactory method of forming embankments. The formation level of the railway could

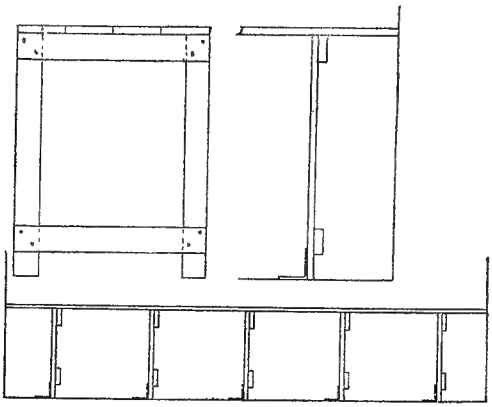


Fig. 7.—Simple baseboard supports.

Fig. 8.—Gradients.

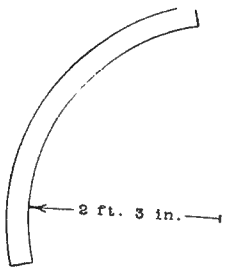


Fig. 9.—Gradient curves.

consist of bituminous roofing-felt of a thin variety, sanded, unless "Treetex" is used. But this excellent material has an ideal surface which requires no covering if it is painted to suit its surroundings. Retaining walls (one side of the sketch) are built of cardboard or fretwood covered with stone or brick paper, or painted for cement, and faced up with projecting piers and pilasters. The other side shows the embankment slope which is formed with stiff grey paper as used for parcels. This is cut liberally to size, crumpled in the hands tightly, and the top edge slipped in beneath the edge of the surface felt and sprigged through. Newspapers are then stuffed into the under-space behind the embankment and the front edge of the latter sprigged down, using small cardboard (postal card) washers under the sprig-heads. After giving a coat of glue-size to the bank, tint up the whole surface with water (poster) colours, with brown and buff predominating, and a touch of yellow, purple, and grey. When dry, coat the lower edge with tube-glue, using a piece of paper in the fingers, and sprinkle with grass, earth, or ballast material, or with sawdust dyed for these effects.

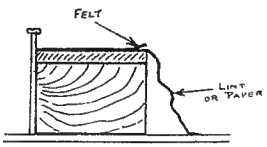


Fig. 10.—Embankments.

For use in forming cuttings of a fairly large or deep kind, medical lint dyed in a roll by inserting in Fairy Dye (almond green) will be found good. Follow Fig. 11, which is very clear. Better still is plaster-of-Paris lint, attached damp to the framework. It may be painted with poster-colours when dry and set. More will be said on this subject, and on that of retaining walls, in the next chapter.

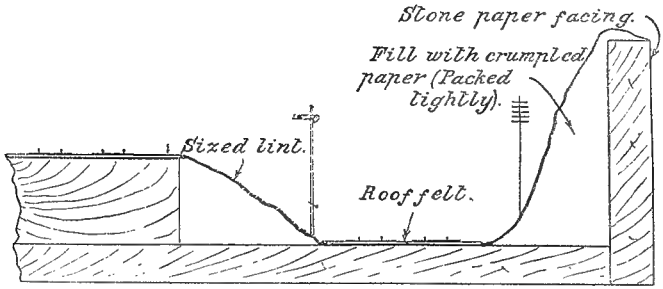


Fig. 11.—Cuttings.

At the entrance to a tunnel there must be placed a suitable facing or tunnel mouth, and in Figs. 12 and 13 designs are given. For OO-gauge and HO-gauge the same sizes will serve, but if the builder is extremely meticulous let him refer to the sizes in Fig. 1. The second tunnel design gives an idea of suitable piers, etc., for a retaining wall. Fig. 14 depicts the method of forming the framework of a movable tunnel. The basis consists of a rectangular plain wood cover as shown in the section. To the back of this is attached for the full length a rear disc of

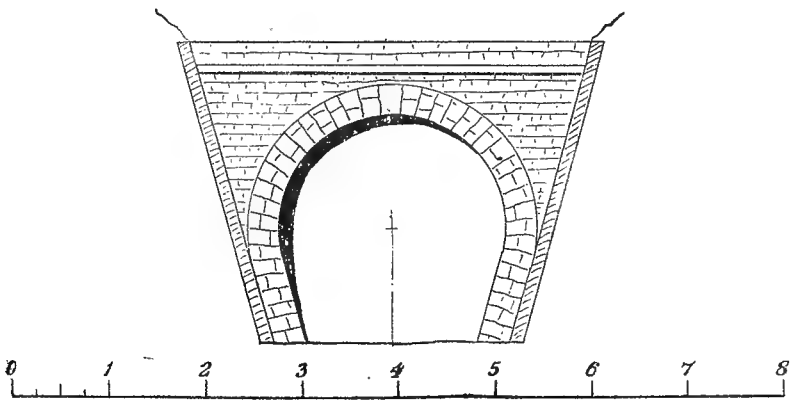


Fig. 12.—Tunnel mouth.

cardboard or plywood, cut to form the shape of the top undulating edge of the hill. It is supported in place by sprigs and by triangular blocks of floorboard. One wing-wall at each entrance may be arranged to lie flat against the wall ; the other wing-walls, one at each end or as required, should project at an angle, which is secured by a flat disc of card at ground level, stuck in place with gummed strip. A large piece of dyed medical lint to cover the whole of the top is now stuck with glue along the rear top edge of the upright wall disc. Underneath it is packed newspaper crumpled in the hands and pressed tightly home. Get the hill surface nicely irregular and realistic. Now glue tightly the bottom edge of the lint on the

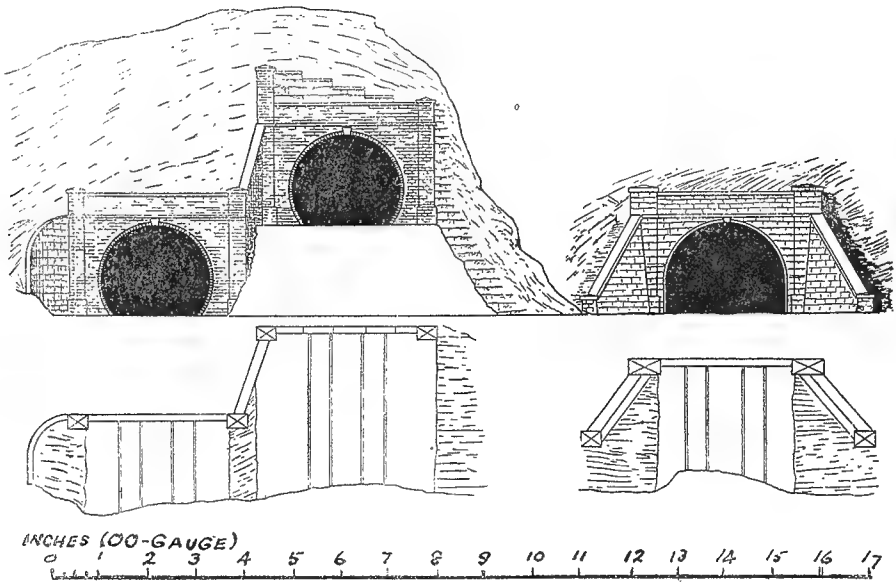
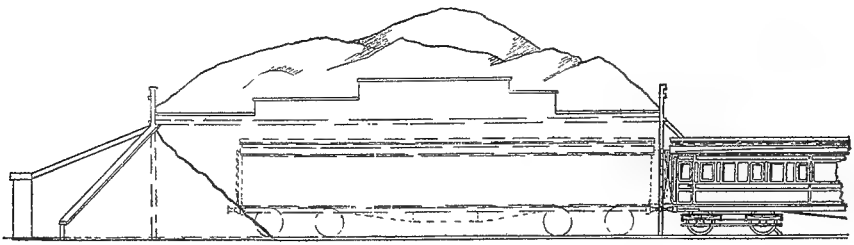


Fig. 13.—Tunnel portals for abnormal situation.

front inside of the tunnel. Use a few drawing-pins to retain it whilst the glue sticks. The front retaining wall is now formed of fretwood or thick card and shaped along the top as required, each end coming a little higher than the corner of the tunnel mouth, as indicated. This is faced up with building paper, and the coping added. Then the corner piece of lint is added to the wing-walls which project. The lint is attached to the wing-wall with a cardboard strip and glued underneath the sloping edge of the front wall, being glued also underneath. All that remains is to get to work with poster colours and to add a few small trees and shrubs on the lint.

Several simple bridge designs are included. These need little comment. A track or road-deck of floorboard or ½-in. plank may be used. Plate girders are of fretwood, with strips of card cut thinly and glued on the surface for the uprights. Keep the glue off the surface of the plates except under the strips. Piers are of ½-in.



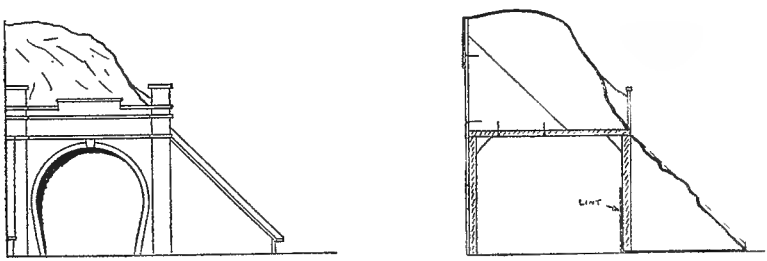


Fig. 14.—Movable tunnel.

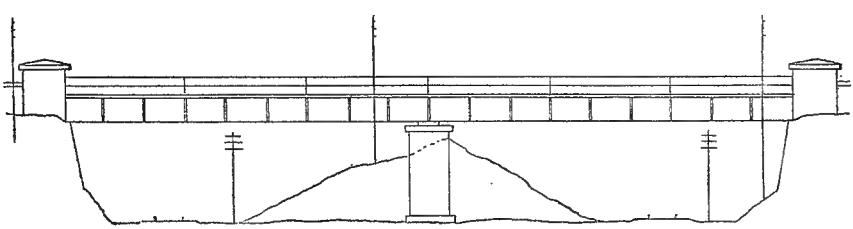


Fig. 15.

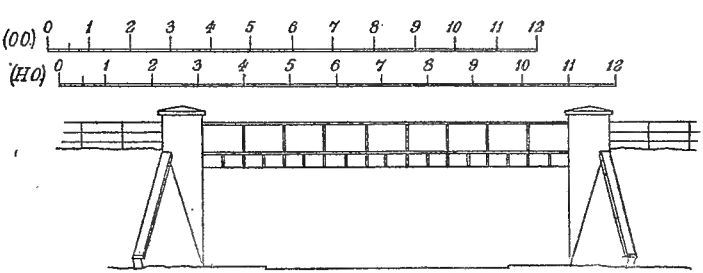


Fig. 16.

strip-wood. A good finishing colour for bridge ironwork is red oxide or light grey, the piers being in concrete or brick or stone. The skew bridge (Fig. 17) is an interesting modern type perhaps not hitherto modelled. The girders may be of wood strip or metal. A novel design for a pivoted lift bridge is given in Fig. 18. The electrical connections are led into the bridge at the pivoted end by means of coiled

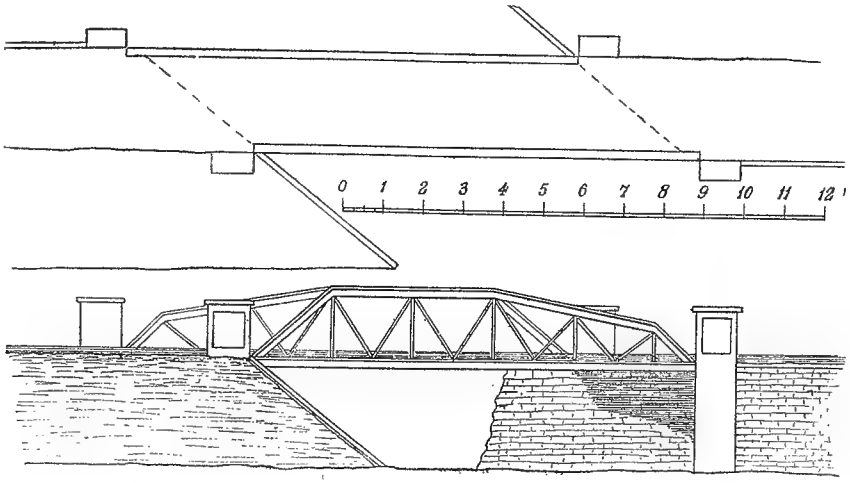


Fig. 17.

lengths of flexible wire underneath, which should be brought in from the main line through the narrow aperture behind the pivots.

We must now proceed to the subject of layouts, though in our limited space we shall have to content ourselves merely with one or two typical examples. We shall in fact, confine ourselves to three original designs—two of these suited to the typical kind of restricted site usually available and a third somewhat more ambitious. The first plan (Fig. 20) is arranged for a small room or garage 12 ft. by 7 ft. 6 in. in size. It will at once appear to the amateur that a great deal is possible even in such a limited sphere as this when working in the smaller scales. The plan is a two-level one, having a continuous run and single-track arrangement, with a point-to-point route for the main line and an additional loop-line to a dock. The main station A is on the low level, 4 in. below the track level of the highest terminus. Beginning from station C on the high level, trains at once begin to make a steady descent of 1 in 80 to the bridge on the west side, thereby reaching a point $2\frac{1}{2}$ in. above the low level, the bridge being ungraded. Leaving the bridge, the line continues at the same gradient to the south-east corner, where it has reached a level of only $1\frac{1}{4}$ in. above the low level, and where it is joined by another rising grade from the same direction. Here it passes under the station C again at a fall of 1 in 56

till it reaches the low track behind station A. It can go on running indefinitely on this loop round and round the room until switched over (on the west side, near bridge) to the dock loop or the track leading to station A, the latter passing under

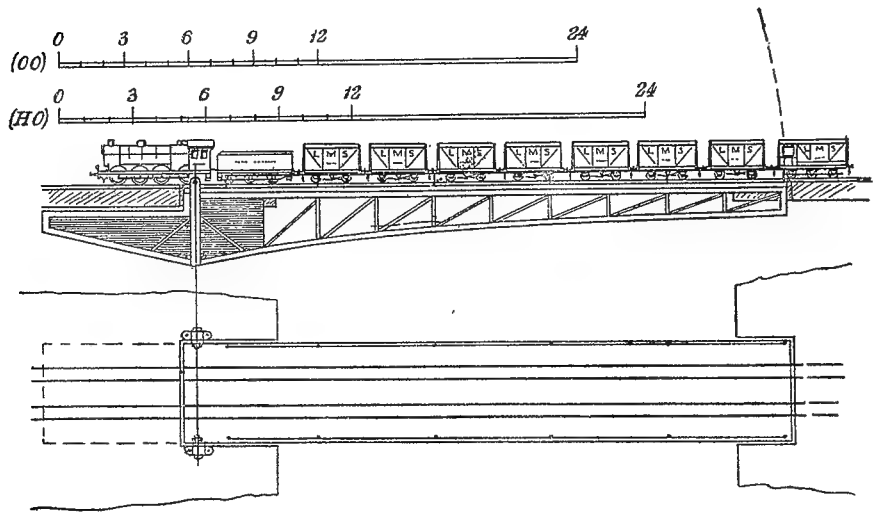


Fig. 18.—Pivoted lift bridge.

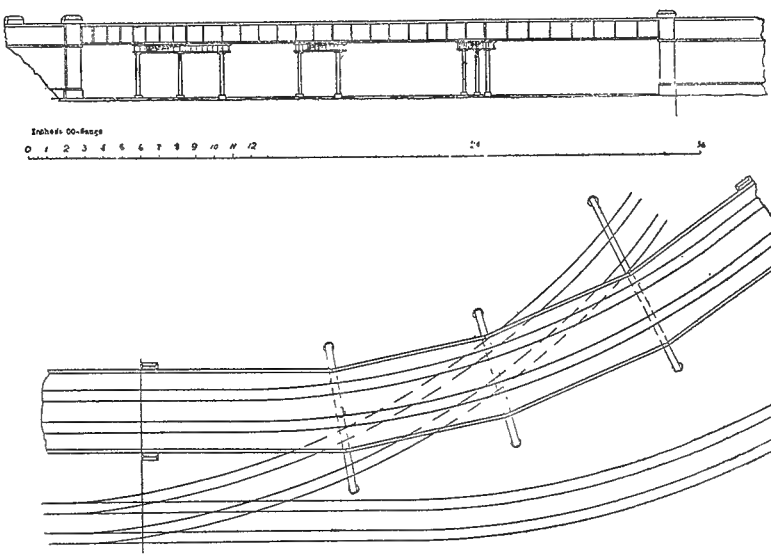


Fig. 19.—Flying girder bridge for difficult location.

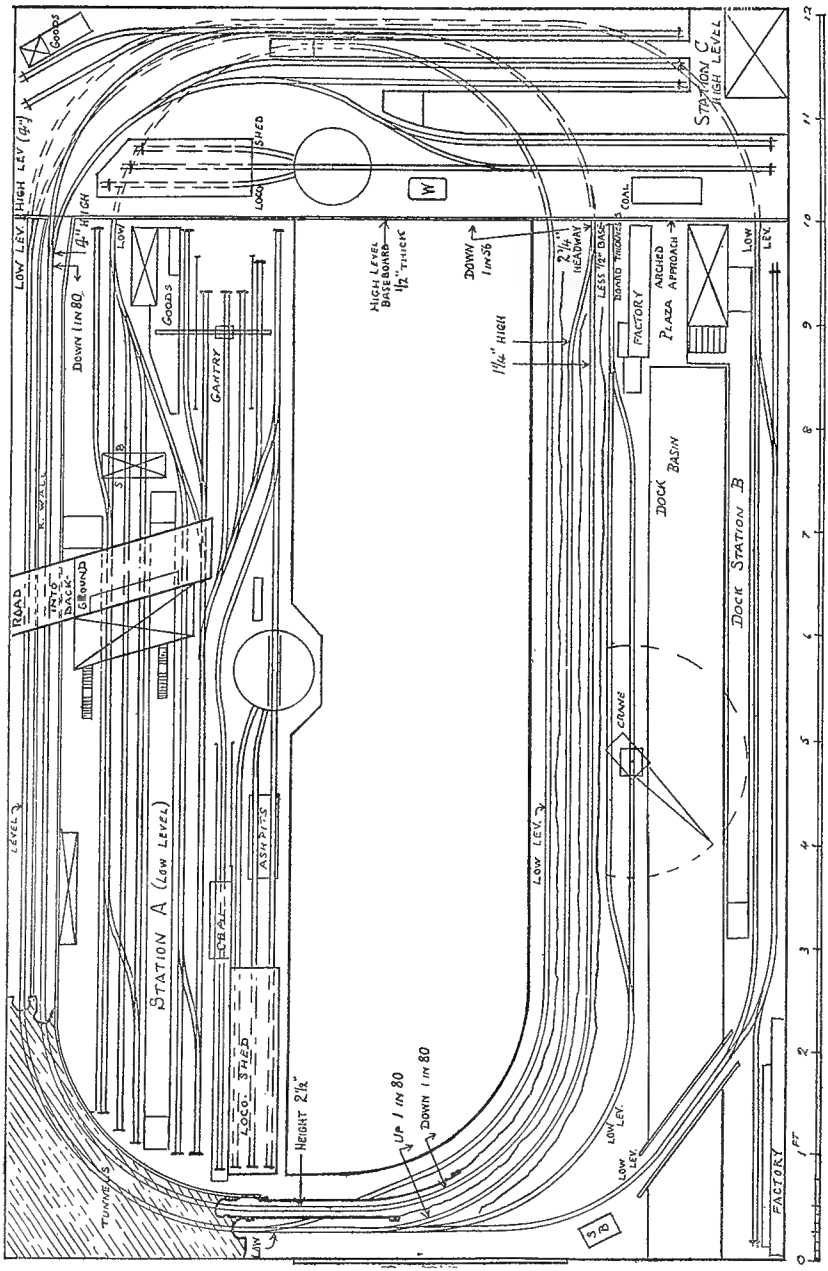


Fig. 20.—Layout for space, 12 ft. by 7 ft. 6 in.

the bridge. The dock loop is continually on the low level. The layout of station A is quite full and elaborate, including an unusual through-road track across a coach-storage siding between the two main lines. Proper provision is made for freight, and there is an extra coach siding on the north side. Here, also, is the locomotive depot, though there is also a smaller shed at station C. Station B is at the dockside. The loop at this station serves for the convenient handling of wagons bound for and from the factory nearby. Another factory above the dock is similarly served with a loop-line. The baseboard under station C is of ½-in. planed wood. Baseboards should be fixed for all four sides at given levels (low and high) and the gradients filled in as already described.

The next layout is also arranged for a garage, slightly larger, being 15 ft. by 8 ft., and the scheme in this instance is that of a point-to-point route without continuous run, but so arranged by means of a loop under a tunnel as to permit trains moving from the main terminus on the down line to come back without reversing on the up line after traversing the whole system. Beginning at station A, trains begin to descend at the first tunnel entrance and continue on the down grade to station B, thence passing at low level through the tunnel section below the first station and right around the loop into station C. This is the outer terminus, though no turntable is necessary owing to the loop. Trains thereafter return by the same route on the up line. An additional line runs out from station B to a factory site in the north-west corner. The stations should be interesting and adequate, and most extensive provision is made in this plan for the storage of both coach and wagon stock. The garage would presumably have double doors ; one of these should be fixed as shut, and entrance would then be had through the other door. No lifting portion is really necessary. The baseboard might be high enough for stooping. Station B has a couple of quaysides, one for passenger traffic, the other for freight.

The third layout (Fig. 22) offers a suggestion the general idea of which I owe to Mr. Linn Westcott (U.S.A.), though I have considerably altered the scheme to suit a comparatively small space, 20 ft. by 14 ft., the site consisting of an L-shaped building, the remaining part of which might be reserved for a workshop. There are two levels in the plan and five stations, part of the system being double track, part single. From station A to station B the track is double, and passes through a cutting over a tunnel. Thereafter it becomes single-line, running around the room over station A, past a large sawmill and then immediately over a concealed loop and back, continuously around the same route, until it passes east to the halt C, thence to D, and finally into terminus E. There is, however, a connecting line between stations A and E which renders the entire run again possible, including the continuous line. There is also a branch line from the extreme north-west corner leading to a fair-sized dock on the south-west side. In passing the sawmills on the continuous run, it should be remarked that there is a fast line for repeat journeys.

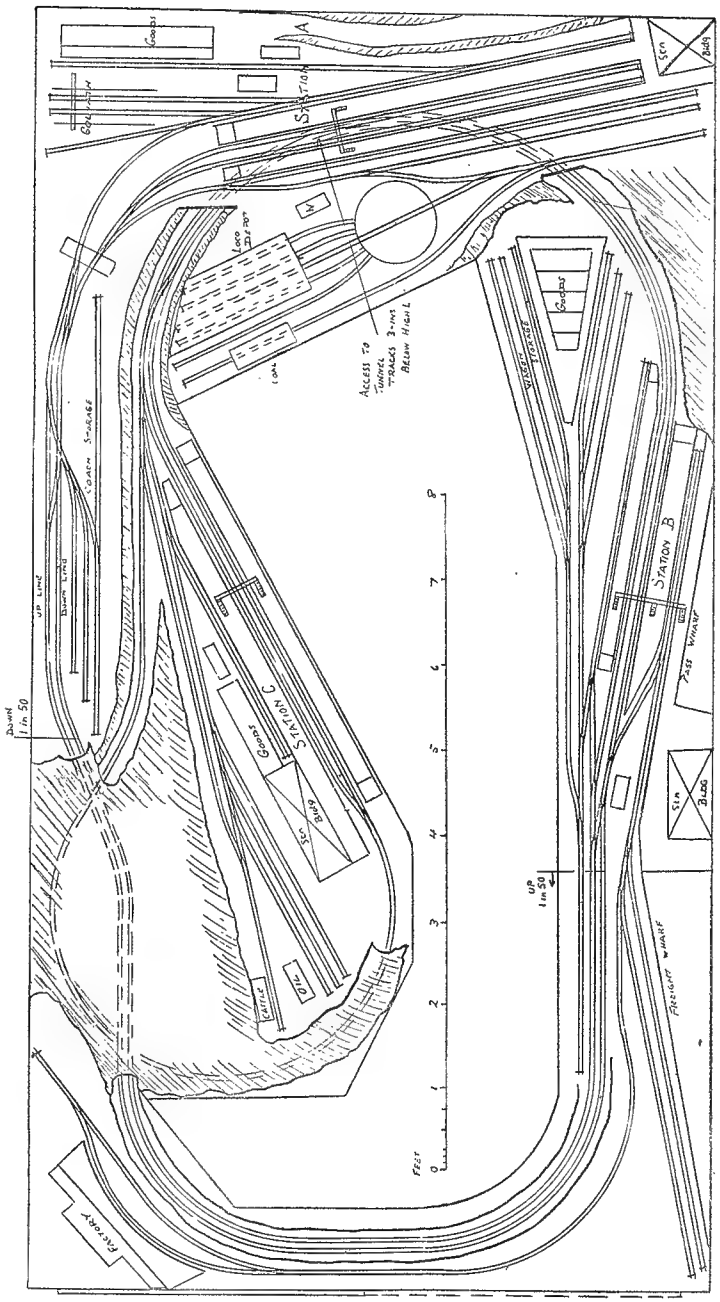


Fig. 21.—Layout for garage, 15 ft. by 8 ft.

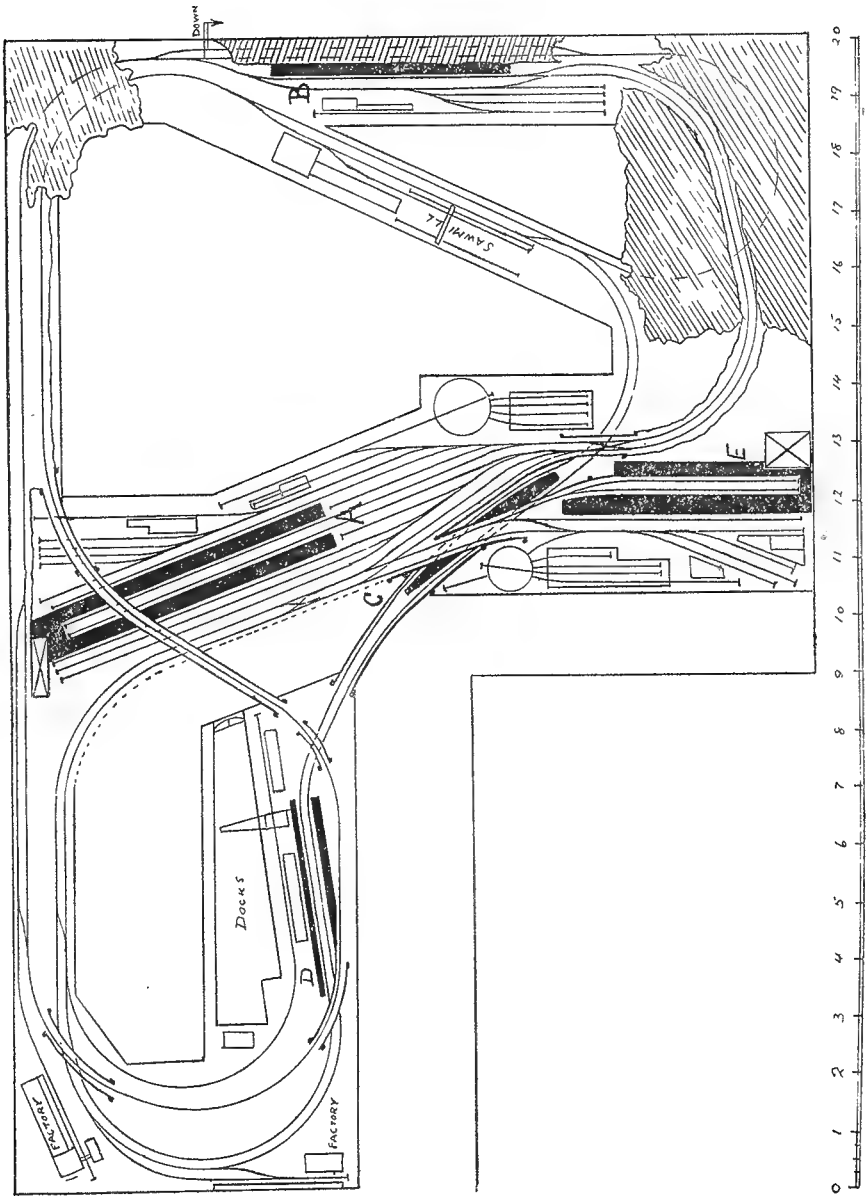
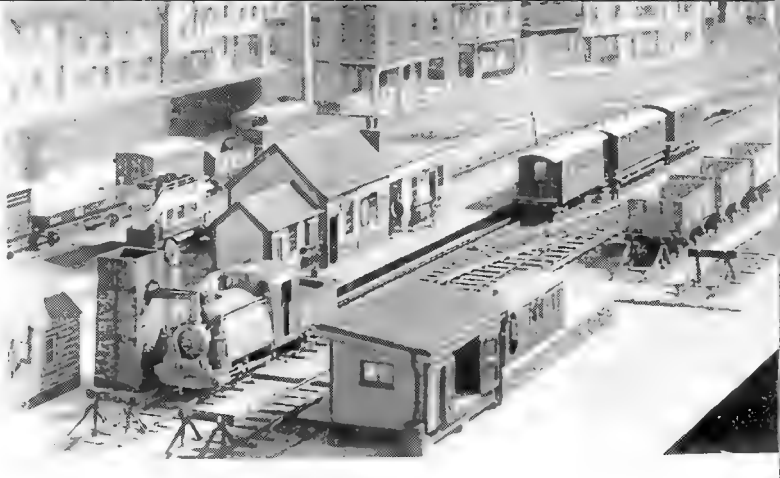


Fig. 22.—Layout for large room.

Above : Tracks and platforms at Colstead Station, West Midland Lines (1940).

Below : Laurenceton Station, West Midland Lines (1940). Dock basin on right.



Station buildings at Madderport.

An old house by the river.

Another view of the old house, showing landing steps.

A number of passing loops are provided, and as one of these lies within the tunnel on the east side, it forms also a convenient place for concealing a delayed train indefinitely. Some form of automatic light signal might be installed to indicate and remind the operator when this track is not vacant.

Fig. 23 gives a suggestion for a typical through terminus station. My reason for including it is in order to indicate what may be done in the way of introducing, for the purpose of general interest, streets and highways into a layout. I shall also give at a later stage a design for the station building suited to a plan of this order. A photograph of Methven Station on the late West Midland Railway will also further help to elucidate such a plan, this depot being set out on similar lines.

We must now hasten on to the most important of all subjects for the railway modeller—that of track-making. I have spoken of the real importance of forming a perfectly even surface for the track in the first place. It must be borne in mind that in HO- and OO-gauges the need of this is more urgent than in any other scale. For example, should there occur an error of $\frac{1}{32}$ in. on the model, this would be equivalent to 3 in. on a real railway. One can realise at once what would take place if the gauge of an actual railway were to vary from 4 ft. 6 in. to 4 ft. 11 in., and the need for extreme accuracy will immediately be clear.

The question of the true gauge dimension must first be dealt with. As a matter of fact, the popular term " five-eighths-gauge " is a misnomer ; the actual gauge for HO and OO railways should be—and indeed must be, if commercial products are to be made use of—16.5 mm. It is the opinion of the writer, as well as a large number of experienced manufacturers and clubmen throughout Great Britain, that this point should be definitely settled once for all. In point of fact, it has been settled for some time, and all that now remains is for builders to reconcile themselves to an inevitable state of affairs and make the most of it. The multiplication of track-gauge standards would not only be a fatal thing for the hobby, but it is an impossible thing for all those who retail mechanisms and parts. It must be made clear that the amateur himself will be the sufferer if any deviation from this standard occurs.

Another vital matter is that on all curves this gauge of 16.5 mm. must be increased to 17 mm. No HO and OO engine will run satisfactorily on curves with the same track-gauge as straight track. There must be an increase of $\frac{1}{2}$ mm. This will allow for the retaining of flanges on the centre wheels of six-coupled mechanisms if desired, but even if the flanges are removed the same need prevails.

There are a number of different types of track on the market, all more or less satisfactory, and the writer does not desire to speak slightingly of any type, for all have been well tried out. But undoubtedly the cheapest method is for the modeller to do his own track-making, using the brass or steel rail on the market along with

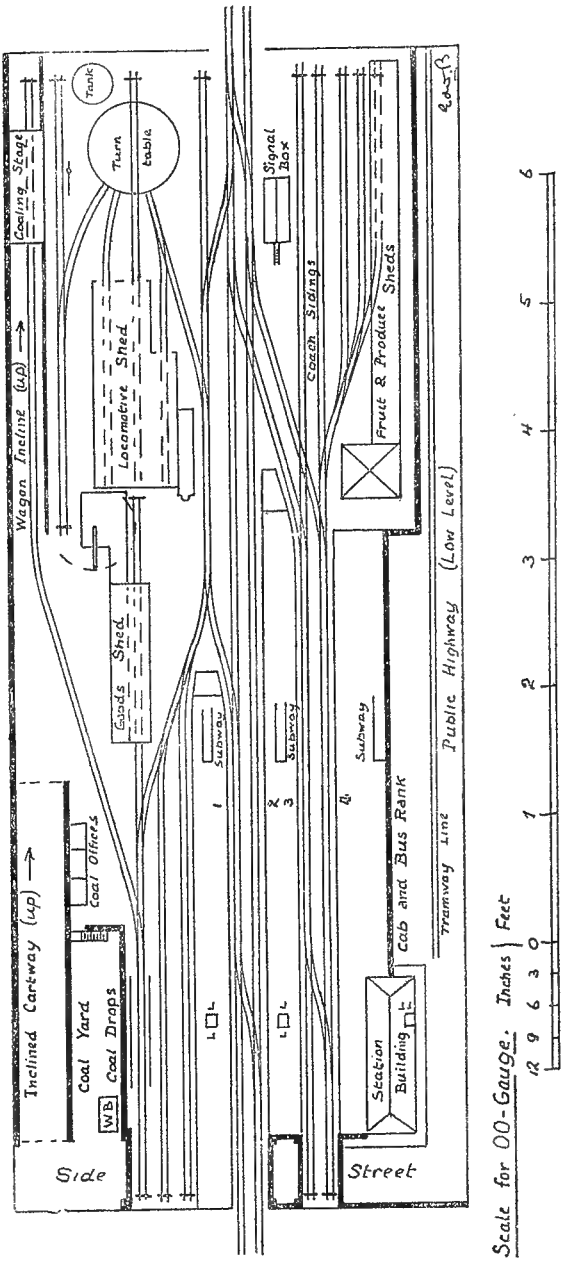


Fig. 23.—Through terminal station.

tinplate or thin brass sleepers as sold. This work is carried out by means of jigs, of which several varieties will be described. Let us first deal with plain lengths of straight track. Fig. 26 shows a suitable jig for this work, consisting of a length of $\frac{1}{4}$-in. stripwood $1\frac{1}{4}$ in. wide, with small blocks sprigged on its surface having $\frac{1}{8}$-in. gaps for the insertion of sleepers at regular intervals. The plan and elevation of such a jig are shown, and the shaded lines represent the track in place. The jig is made by sprigging the cut blocks in place while using a lath, and a piece of $\frac{1}{8}$-in.

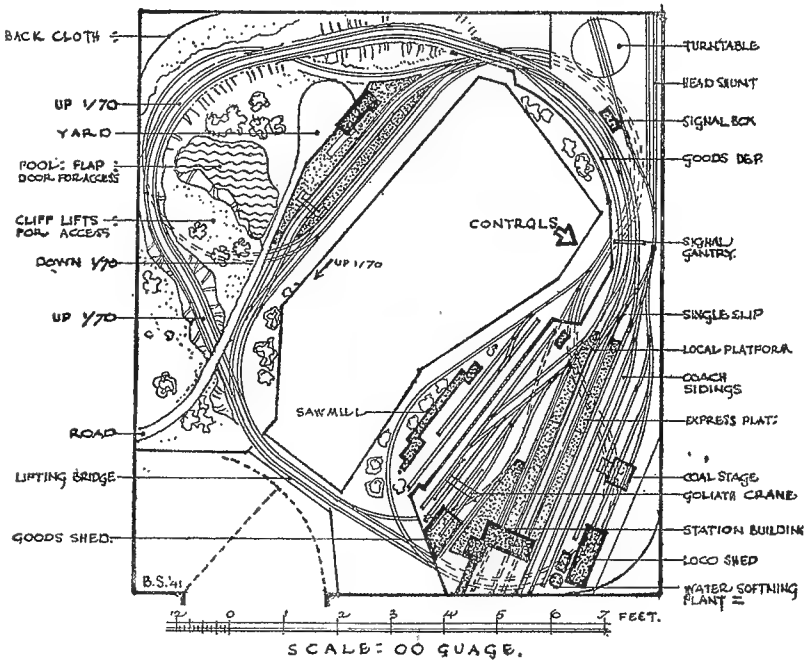


Fig. 24.—Captain Basil Spence's layout for a small space.

square section brass for laying between them as they are attached to the board. In making the track, the sleepers are first slipped in place all along the jig (and I think that the thinner the section of the sleeper the better) and the two rails soldered in place, the solder, of course, on the outside of the rail, so as not to foul the running. The finished length is taken out of the yard-long jig quite easily with the help of a small screw-driver. For making curved track the same idea exactly is adopted, but the wooden base of the jig must be curved, and cut to a true arc of the curve to be made, 2-ft. radius being the minimum. The gauge blocks must also be 17 mm. instead of 16.5 mm.

A simpler procedure for curve-making is that shown in Fig. 30, though it must be used with extreme care. Here a sheet of stout cardboard or thin plywood is used for the jig, after the curve has been made in the straight jig, leaving off one only of the rails. That is, the straight jig is used for attaching one rail only to the whole yard of sleepers. The cardboard (or plywood) template is then cut as shown and attached to the work bench with drawing-pins. Under the loose front edge, which is curved, the finished side of the straight track is then inserted and pressed in place while the second rail is added. The track-gauge which is employed for this purpose is a piece of $\frac{5}{8}$-in. lath about 2 in. long, the precise length of which must be ascertained by experiment—it must be just long enough to keep the rails 16.75 mm. apart when inserted between the finished and unfinished rail. The writer has made hundreds of feet of curved track by this method.

A new form of jig—first, to my knowledge, introduced by Mr. John L. Rea of Dundee—may well be described at this point, embodying as it does some very admirable features. In this jig the track is made in double lengths, not single,

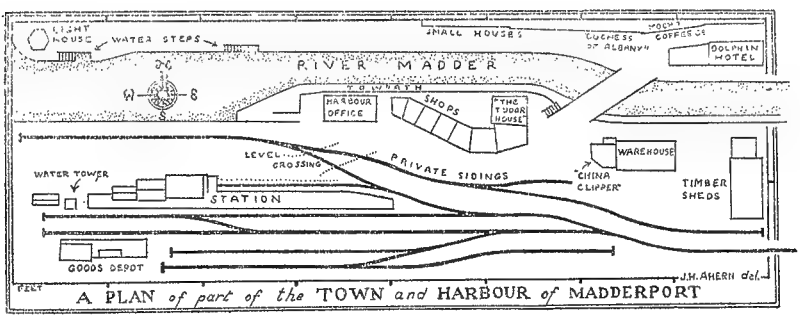


Fig. 25.—Mr. Ahern's layout at Madderport.

both straight and curved, the longer type of " Merco " sleepers (as used for cross-overs) being employed. This is a very considerable saving of time and labour, and the straight lengths may be guillotined by a tinsmith into single lengths if desired. Curved track is made with the sleepers set in at a correct tangent, and may be laid forthwith on the baseboard. On the other hand, either curved or straight lengths may be made singly in the same jig, and the curved jig serves for curves of two differing radii, if used for single track only. A double length of track may be made, with practice, in half an hour.

The straight double jig is made of a 3-ft. length of $\frac{3}{8}$-in. plywood of a width just a fraction over the length of the sleeper to be used. On the edges of this board an " O-gauge batten " ($\frac{1}{2}$-in. by $\frac{1}{4}$-in. stripwood) is screwed, the $\frac{1}{2}$-in. face against the edges of the board. The board is lined out at intervals of $\frac{5}{8}$ in. with pencil

marks at right angles with the edge, this work being more conveniently done before the side laths are screwed on, a joiner's square being used. The first line should be $\frac{1}{4}$ in. from the end of the board. A trammel is then made, consisting of a piece of T-brass, $\frac{3}{8}$-in. T, 4 in long. One-quarter inch of the width of this T is now filed off, leaving a web $\frac{1}{8}$-in. deep. This means that there is now a $\frac{1}{2}$-in. flat face with a vertical web of $\frac{1}{8}$ in. Next file out the end of the web so that the trammel fits over and into the stripwood runners on the jig sides, running freely along with the

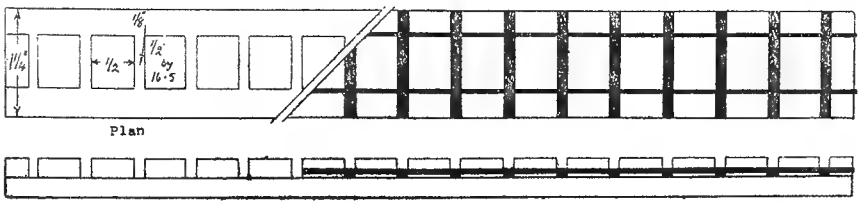


Fig. 26.—Simple straight jig.

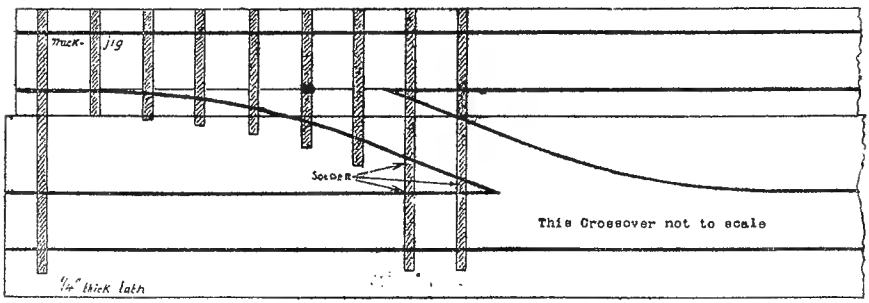


Fig. 27.—Straight jig used for crossover.

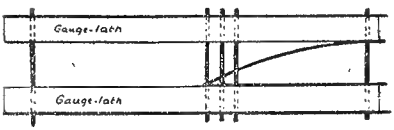


Fig. 28.—Beginning a crossover.

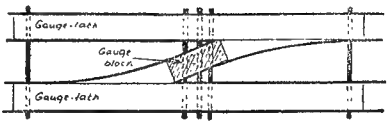


Fig. 29.—Frogs fixed.

hand. Consult Fig. 31. The trammel is then filed out to fit over the rails, the notches being cut as indicated. The cuts or notches must be an exact fit over the rails. One excellent feature of this jig is that it keeps the rails absolutely vertical while being soldered. A file, or similar tool, is used to hold down the rail with the left hand while it is being soldered.

The sleepers are held in this jig by means of pins, the fixing of which is a somewhat tedious task, but once fitted, the work is well worth while. One guide for each sleeper will be found, of course, in the lines already pencilled at every $\frac{5}{8}$ in.

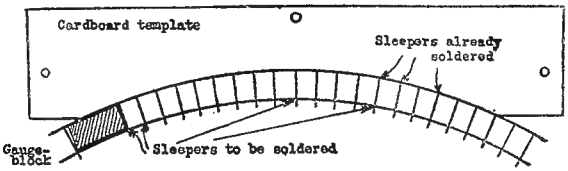


Fig. 30.—Forming curved track.

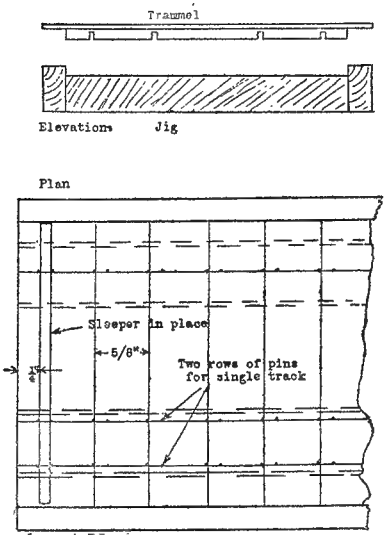


Fig. 31.—Jig for straight double track.

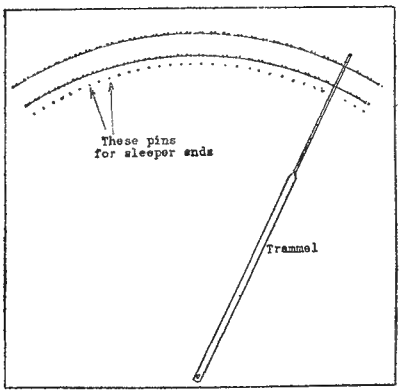


Fig. 32.—Jig for double curved track.

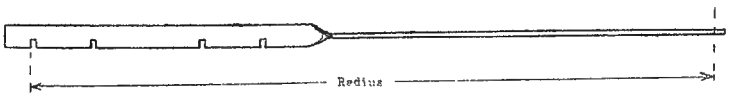


Fig. 33.—Rocking lever.

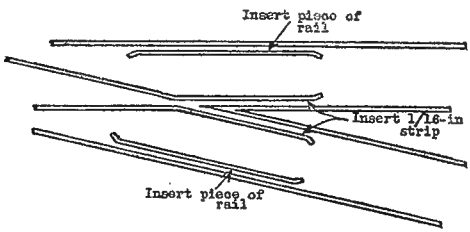


Fig. 34.—Spacing check rails.

The other positions are found by running the trammel along the jig while holding a pencil at the centre of each track-gauge. The pins used are $\frac{3}{8}$-in. brass fretwood pins, leaving $\frac{1}{16}$ in. above the board. The first set of pins are driven in at the point for each sleeper where the lines intersect, two for each sleeper; the pins for the other side of the sleepers are driven with a sleeper in place. All the heads are then cut off. The jig is now complete, and the sleepers are set in place before track-making begins.

For making curves by this method the jig is similar, though necessarily somewhat bulky. It consists of a piece of plywood 4 ft. square and of good stout calibre, and the trammel in this instance is a length of brass strip about $\frac{1}{4}$ in. by $\frac{1}{8}$ in., forming a permanent compass, which at approximately half its length is given a 90° twist. One end is drilled to take a fine screw and the trammel is ultimately screwed permanently to the base at the centre of the circle of which the track is to be an arc. No edging is necessary for the board, as the length of the compass defines the radius. The sleeper-pins are set in line with the trammel, each sleeper then being true to the radius of the curve. The trammel is shown in Fig. 32. In the curved jig there should also be a pin for the end of each sleeper.

Point-work is more complicated, but really involves nothing that is very difficult. I have found the best method to be that of using the straight wooden jig and a second piece of lath of similar size. Double length "Merco" sleepers are used throughout. Fig. 27 depicts the procedure, but is not drawn to scale. Begin by joggling slightly the end of each stock-rail which is to receive the point blade. This can be done in the pliers, and the sketch (Fig. 35) is greatly exaggerated; the bend is very slight. Next file up the ends of your switch-rails and frogs. If desired these fittings may be bought from "Merco" complete, the frogs being of solid brass (Fig. 40). Switch-blades should taper down to a feather-edge, the taper being about 3 in. long and very gradual. The frogs are filed at a much sharper angle. Now take a joggled stock-rail and one of the long sleepers. Using the jig, solder the sleeper at one end. Next solder another at the other end, then two more just at the place where the frog will come. Then solder the stock-rail for the other track in the same way. Next set in the first straight frog-rail as in Fig. 28. Fig. 29 shows how to set in the pair of curved frog-rails with the aid of a small block of wood as used on the first curved jig described. Use the 16.75-mm. gauge. When the frog is formed, strengthen it by well filling it with solder through to the sleeper.

You have been working all this time with the straight jig and the lath to match below the side of the track not in the jig. You can now go on setting in the sleepers all along. When this has been done the track may come out of the jig, and a 16.5-mm. gauge lath be used to finish the other side, as the sleepers will stay in place without a jig. Now file off the waste solder from the frogs till they are smooth. If desired, short sleepers and odd lengths may be used—where these will fit, of

course. The switch-rails are then bent accurately to shape, as in Fig. 4 (crossover). The spacing of the wing-rails and check-rails is shown in Fig. 34, and requires great precision if several types of wheel are to run on the railway. (The wing-rails are the continuation of the switch blades, the check-rails are those opposite.) To space the wing-rails, insert while soldering a piece of $\frac{1}{16}$-in. strip brass ; for the check-rails insert a piece of OO-gauge rail. In setting in the switch blades, solder them only along the wing-rails. Then solder a long sleeper under the blades at the mouth of each turnout to form a point rod. This is done in the manner of Fig. 36. The curved blade is soldered first, then it is pushed over and the straight one soldered, leaving the necessary space for the " throw " of the point. In soldering, do not hold the iron too long in position, or you will solder the blade to the stock-rail. The solder inside the mouth of the point should be filed down with a

Fig. 35.—Joggling rail.

Fig. 40.—
Solid frog.

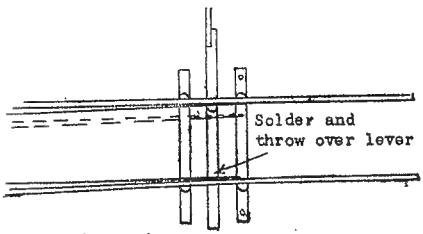


Fig. 36.—Setting point blades.

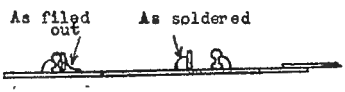


Fig. 37.—Soldering blades.

Fig. 38.—Sloping conductors.

Fig. 39.—Live rail circuit break.

small rat-tail file (see Fig. 37) so as to clear the wheels of vehicles. Points for the single right- or left-hand turnout are made in just the same manner. Diamond crossings are not much more difficult, but require to be made up with the use of a gauge-lath only, as no jig will serve.

All frogs must be made with the utmost care, and not for a moment should the brass strip which is used for forming the spaces between the wing-rails and the frog be removed. Care must also be exercised not to solder this strip by accident to the rails. If aluminium strip is obtainable to the exact size required, it is the best for the purpose, as it will not take solder.

Track, when finished, should be cleansed of grease and flux with a rag and painted on a piece of old cardboard with flat metal-black paint. While moist, the paint on the top surface of rails is then wiped off.

In 3-rail track, the method of attaching track to the baseboard is by means of sprigs set through drilled holes. Specially drilled sleepers can be had for this purpose, and should be placed at intervals of, say, 4 in. in the jigs. Sprigs may be slipped in place and driven with a " Nailfix."

Outside conductor rail is a further item for consideration. This consists simply of running rail laid in proper conductor screws or soldered on the top of $\frac{3}{8}$-in.

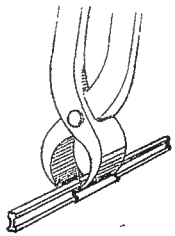


Fig. 41.—Clenching fishplate.

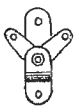


Fig. 42.—Simple angle crank.

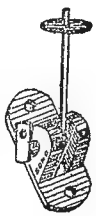


Fig. 43.—Standard point lever.

brass screws driven to correct height into the baseboard. Conductors may be set either inside or outside a double track, and should have its surface $\frac{1}{16}$ in. above the running surface, this level being kept uniform. Where a break naturally occurs, as at a turnout or crossing, the rail is laid in to " overlap " on the other side of

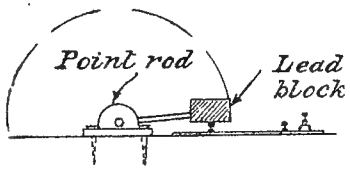


Fig. 44.—A simple movable block.

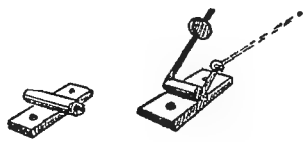


Fig. 45.—Simple point lever.

the track, so that the locomotive collectors are never left free of contact. At every termination of the conductor, the free end is bent down and the underside snipped off to clear sleepers, as shown in Fig. 38. Where there is a break in the conductor for purposes of circuiting, the ends should have an angular lap, as in Fig. 39.

All joints of rails, whether running rails or conductors, must be fishplated, and the best method of tightening up a fishplate joint is shown in Fig. 41. A pair of pincers is placed exactly in position and the sides of the plate pressed in. The ends of all rails must, of course, be filed square before joining.

For the principles of point-rodding I must refer the reader to Mr. Greenly's books on track-laying in O-gauge. In OO- and HO-gauges the best system known to the writer is that devised by him in which fine-bore copper tubing is used with thin piano-wire on a principle similar to that of the Bowden brake. The tubing can be bent to pass underneath baseboards or around corners at a fairly sharp right angle. Components may be had from Hamblings. An excellent and robust manual lever is sold by Hamblings, Bond's and others (Fig. 43). A cheap and quite substantial point lever can be made from (Leeds) O-gauge signal arm bracket (see Fig. 45). A cheap angle crank (OO-gauge cranks are rather expensive) may be made, as in Fig. 42, from a Leeds signal weight bracket and a signal crank. In Fig. 44 we have a suggestion for making a movable buffer-block, to throw over for a temporary buffer-stop, from one of the point levers sold by Messrs. Bond's. These blocks are used on inclines to coal stages, and the like, for retaining wagons in place.

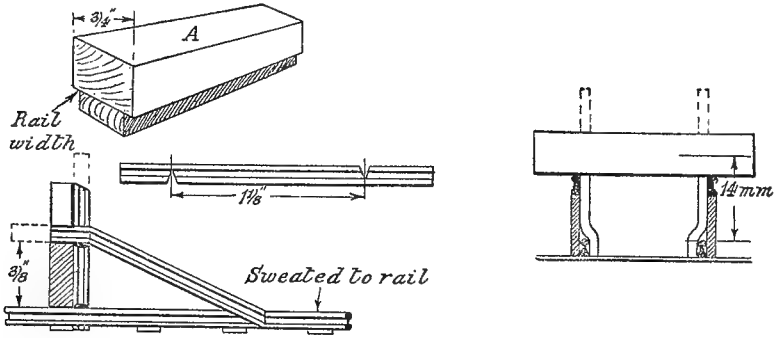


Fig. 46.—Making rail buffer stops.

A standard rail-type buffer-stop is depicted in Fig. 46. These are best made up in lots. Cut up all the rail parts from left-over pieces. File out niches in the side pieces, two for each stop, as shown. This allows for sharp bending, but the gaps should not be too deep. A triangular file is best. Then bend the upright pieces to shape, again two for each stop. Their length may protrude for the time being and may be cut off afterwards. Two blocks of wood are used in the process of making up. One is like A, about 2 in. long, the top block $\frac{3}{4}$ in. wide, the lower 16.5 mm. The lower fits between the rails, the upper serves to hold the uprights against the rails whilst soldering. The other piece of wood is $\frac{3}{8}$ in. wide and fits exactly under the side pieces, which are first allowed also to protrude. Start by soldering the uprights to an ordinary piece of track, any length ; get them rectangular and both alike. Next, having bent the side sloping pieces, solder these by sweating them outside the running rails and also to the uprights, the long ends

resting on the $\frac{3}{8}$-in. lath. The buffer-beam is a piece of $\frac{1}{4}$-in. by $\frac{1}{16}$-in. brass strip, but two bits of rail may serve, one above the other. Solder the beam at the back on the inside of the uprights. Now trim off the long ends and file up. Paint black or white, with a red front for the beam. Several may be made in an hour.

A word may be said on track footways, especially where conductor rails are in vogue.

It is customary, in addition to the usual wooden path across the permanent way, to erect short white boards close up to the sides of the live rail and slightly raised above them. Fig. 48 makes this clear. These " boards " should, in model work, be of metal—thin sheet brass filed up to shape—so as not to shut off the collectors from the current. The footway is made from stripwood or Dennisons'

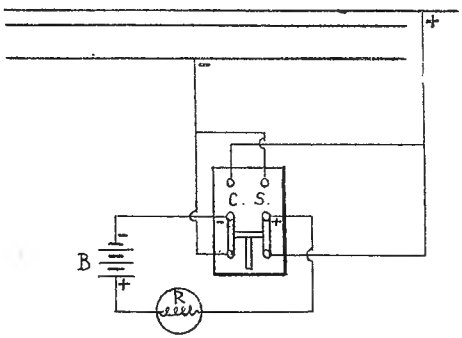


Fig. 47.—A simple railway circuit.

cardstrip, $\frac{1}{2}$ in. by $\frac{1}{16}$ in. This is cut and glued in place as indicated, leaving spaces for the wheel flanges only. A touch of solder will retain the live-rail shields. These footways are common to every passenger station, being located across the trackway at the platform end.

We shall conclude this chapter with some reference to the more simple electrical connections involved in OO and HO work. In Fig. 47 we have a diagram giving the normal reverse-control wiring for a simple railway circuit of the model type. B is the source of power, battery or accumulator ; the type of switch which the writer has found best for ordinary work where standard controllers are not used is shown in Fig. 52. This is known as the 5-amp. knife-switch, and is not too costly. R in Fig. 47 is the resistance or rheostat, and again it is recommended that if possible a resistance as used for radio service be employed when cost is a consideration. The writer bought a pair of resistances of German manufacture at a sale in a radio store, paying 6d. each for the instruments which had formerly been marked at 7s. 6d. They have asbestos sheathing for the platinum coils, and are fitted with

the common knob control. They proved most excellent after four years of hard service on the West Midland Railway. It will be seen that the control-reverse switch has six points, the main leads being brought straight from the battery to the two central studs. These are controlled through an insulated handle which throws the power into one of two directions. The alternative pairs of studs are wired together and the leads carried one to the running rails and the other to the insulated conductor rail. It will thus be obvious that when the lever is thrown over in one direction the conductor is positive and the rails are negative. In the opposite position the direction of the elements is reversed and the motor works in the opposite way. The current is off when the switch is not in contact at all. If an ammeter is installed to indicate short circuits and to reveal the amperage under consumption (a 20-amp. motor-car ammeter is excellent), it should be placed on one of the leads between the main switch and the battery.

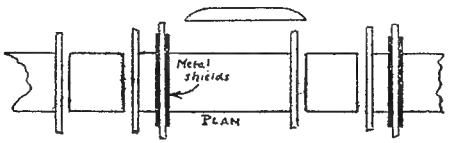


Fig. 48.—Track footway crossings.

The source of power should be 4 to 6 volts, fed from either a set of three accumulators or served through accumulators by a rectifier or rotary transformer. The latter method is operated from a mains house supply and, of course, obviates the need of recharging batteries. A good type of motor-car battery is best suited for use on a layout. It is probable that eventually the standard of power for OO-gauge will be 12 volts.

In laying the conductor rail the utmost care must be taken to set in the screw supports so as to clear definitely the ends of sleepers. It is a good plan in laying track to cut off one end of all the sleepers where the screws will occur—say at every 4 or 5 in. This makes such trouble as leads to tantalising short circuits impossible. Another good notion is that of dividing up the whole of the layout into small sections and wiring these through, say, twenty push-pull switches, each with its section number above it on the switchboard. There will also be other such switches for separate platform control, and so forth. Place all together, and in the event of a " short " it is the simplest matter to cut out all the sections, then to switch them in one after the other till the offending section is found. Otherwise you may spend tedious days in looking for some single spot where a false contact has occurred by reason of heat or cold expansion, or other mishap. There must, of course, be no contact whatever between running rails or sleepers and the live rail.

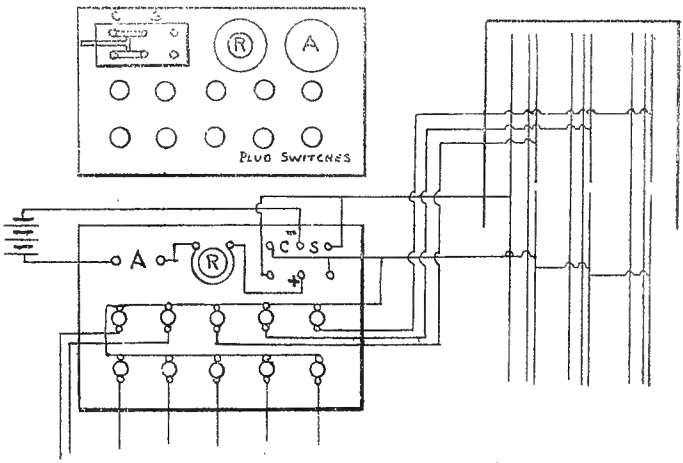


Fig. 49.—Reverse side of switchboard.

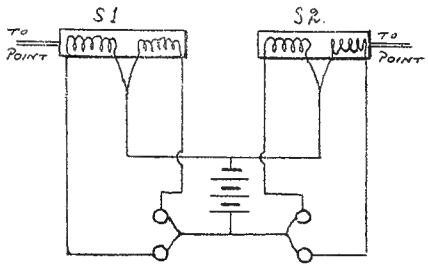


Fig. 50.—Wiring point solenoids.

Contact and core.

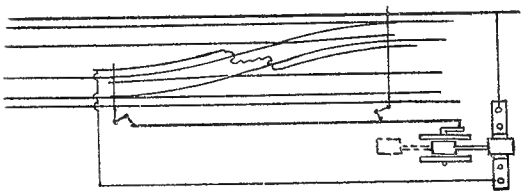


Fig. 51.—Crossover current set with points.

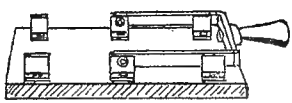


Fig. 52.

This makes an immediate short circuit, which ruins batteries, makes the resistances red-hot, and may lead to danger. But it takes a long time for the "short" to become a grave matter when working off 6 volts.

The West Midland Railway had a 6- to 8-volt supply, but 12 volts is to be commended and will shortly be the normal practice, having now been almost universally agreed upon by manufacturers.

Now, passing to Fig. 49, we have the sketch of a typical single-circuit switchboard, where A is ammeter, B is resistance, CS is control switch. Below these are two rows of five plug controls (as sold by Woolworth) for separate dead alive sections of the track, by means of which engines may be kept at rest in a siding or at a platform or within an engine shed while the main circuit of the railway is in power with trains running. Fig. 49 shows the reverse side of this switchboard, and also the wiring up of the switches and the leads to an imaginary engine shed having six separate track sections from which engines may be taken or left singly at will. The loose ends of the other leads would go to other dead-alive sections. Ordinary bell-wire is used for all the wiring, but not thin cotton-covered wire. In bonding, or joining electrically together one conductor rail to another, the same wire is used, and is carried through small holes bored through the baseboard.

Thus far we have spoken only of running a railway in one general circuit; but if there are up and down roads, and also under certain other conditions, it will be desirable and necessary to have two circuits. When we dealt with the matter of track-making we spoke of forming track in double lengths, with long sleepers (as, e.g., on curves) serving two tracks. It may appear that there will be a difficulty in insulating the up road from the down road in adopting this track-making expedient. Normally that would be so: and, of course, under ordinary circumstances it would be necessary to insulate the up road from the down road at all crossovers, where the rails themselves join up the two circuits. It is good news for the builder that there are on the market several patterns of controllers which are so wired as to eliminate entirely all question of insulating the up road from the down. No insulation whatever is required, and the controllers give every simple advantage of a single circuit, along with the amenity of having separate control for up and down tracks. If this controller is not employed, of course, it will be necessary to have careful insulation of the up and down roads, and this is impossible whilst using metal-soldered sleepers.

A sound wrinkle may be given with a view to avoiding what is common on many OO and HO layouts—the trouble due to "passing contact" whereby a train, passing the end of a shut-off platform section energises that section through its collectors and sets in motion for an instant or two a locomotive standing at the platform. This is merely a matter of wiring. Adopt the method of Fig. 54. Instead

of linking up the platform section live rail closely to the main circuit live rail, a short section is introduced which is wired in with the main line, as the sketch shows.

A similar snag often occurs with the live rails of a crossover. This can be readily avoided by using the scheme of Fig. 55. Here a manual lever operates the blades of the crossing, and has instead of a throw-weight an insulated contact, consisting of a piece of brass tubing filled with vulcanite. This, when the lever is thrown for the crossover, sets in the power also. When the lever is the other way and the crossover is out of service, there is no power in the crossing live rail, and collector shoes do not foul it.

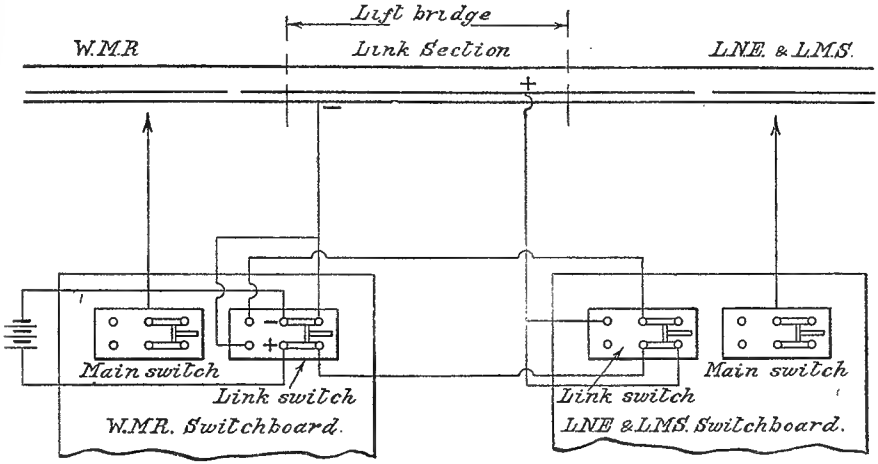


Fig. 53.—Wiring of link section between two systems, avoiding current-crossing. When link switches are crossed, link section is dead.

It is a most convenient expedient to operate certain points not readily accessible to the hand by means of magnet or solenoid motors. These are very simple instruments and cheap to make, and it is a pity there is no really low-priced example on the market. Such motors can be bought, and they are eminently satisfactory, but the price is rather high. The cheaper type sold for signals is not powerful enough for points, and certainly is not of sufficient power for a crossover. I give, therefore, a sketch (Fig. 54) for making a more or less improvised point-operating motor. The foundation consists of two small wooden blocks into which a pair of 2-in. screws are partly driven. These are provided with wooden discs and wound with 20 to 25 yds. (each) of copper wire. Cotton-covered wire will serve, but enamelled wire is better. It should be as thick as the wire on an electric-bell coil. The screws are first wrapped with parcel-tape to insulate them. A sliding contact is then made of sheet brass or phosphor-bronze to run under the coils and through slots in the

blocks as shown. This has a contact soldered on which rises between the screw-ends. The switch may be mounted on a plywood base, which should be as small as possible. The wiring of this and any other coil-motors is shown in Fig. 50. For operating the motor, use a pair of barrel bell-pushes for each coil, one push energising one coil, the other the second coil. Contact is instantaneous and there is thus no heating of the coils. The point rod is soldered to one end of the sliding contact. For all point-rodding which operates directly to the point-blades I recommend the use of tinplate sleeper strip, which lies flat and passes sweetly under the tracks. These motors can conveniently be housed under small buildings.

An interesting wiring scheme is that of Fig. 53, which shows how a lifting bridge between two rooms is made to serve as the breaking-place for a pair of main controls both working from one power supply. It will be seen at once that

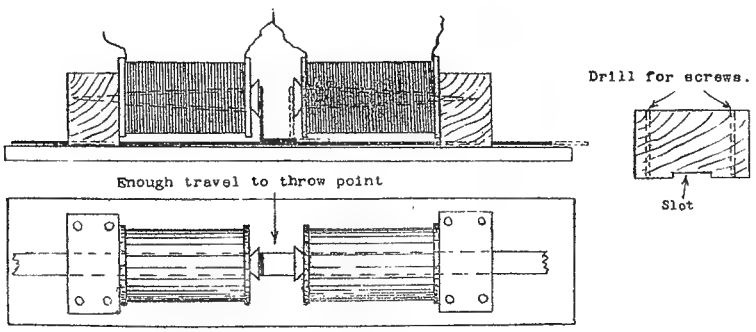
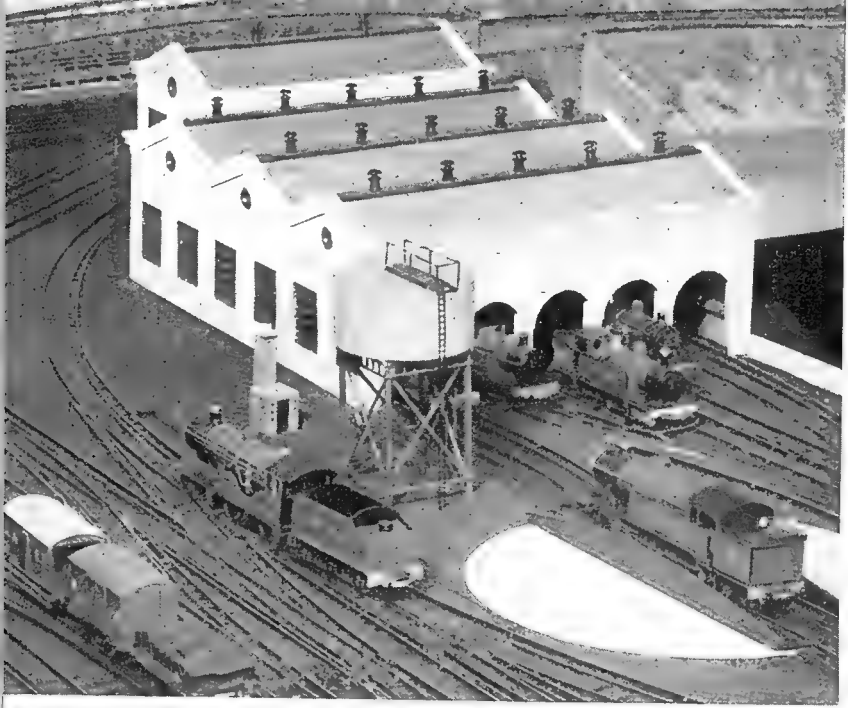


Fig. 54.—A simple form of point motor.

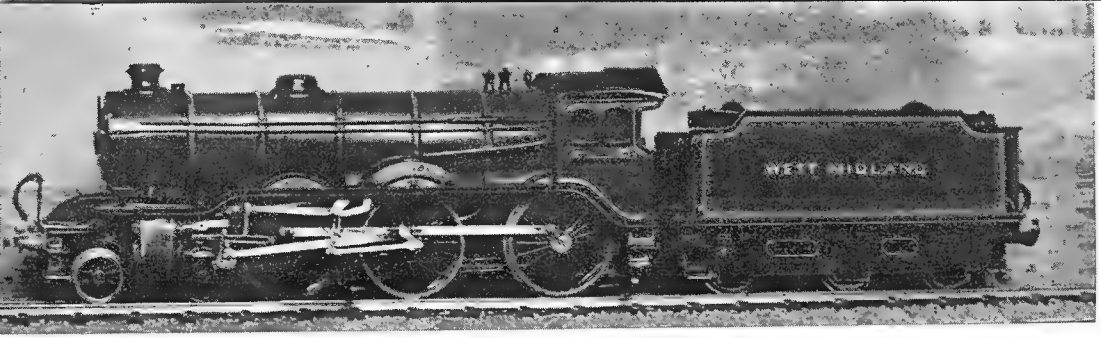
as the operators are not in sight of the bridge, there is a danger of crossing the circuit of the railway when trains, moving in one direction towards the bridge, meet at the bridge, the circuit of the other room set in the opposite direction. To avoid this, each switch has an " echo " switch of the main control, and these two " echo " switches are so wired together as to make the bridge section dead if the current is crossed. That is, they must be thrown over all in one direction in order that trains may run across the bridge—otherwise, the switches being crossed, the train will simply stop.

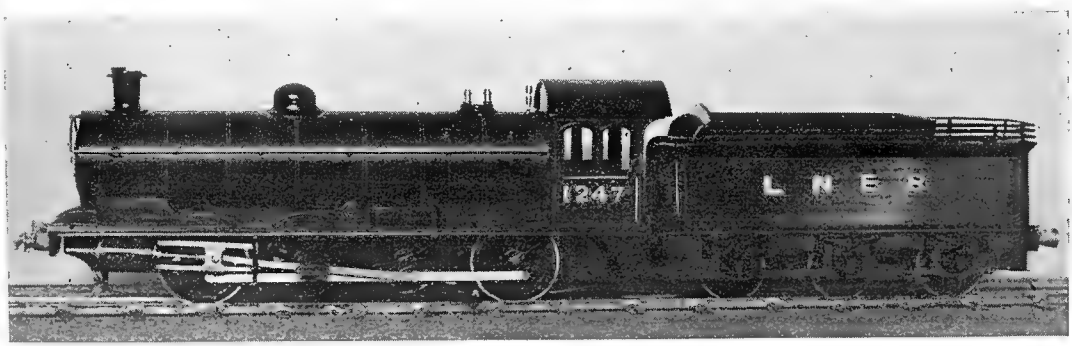
Perhaps the most startling development of recent years is that of the perfecting of what is known as two-rail track and the running of trains without the interposition of a third-rail or overhead conductor. This is a most happy and acceptable innovation, though perhaps it never ought to have been an innovation. Unquestionably, the third conductor is redundant, abnormal and actually (in the light of this advance) a negligible expedient. In his various writings, the author has scrupulously followed up alongside these developments as they have been

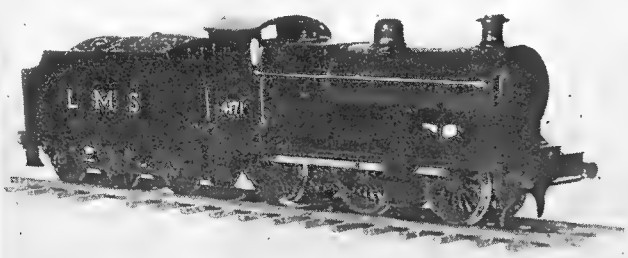


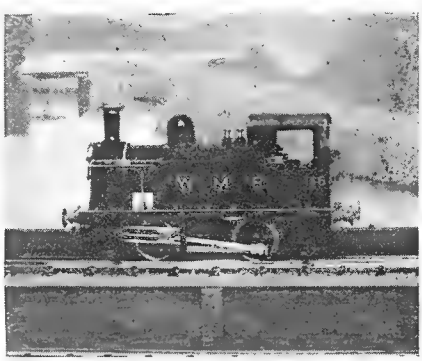
An early locomotive shed and depot on the West Midland Lines.

Concrete coaling stage and mechanically operating ash hoist on the author's OO-gauge layout.









Some locomotives modelled in OO-gauge.

made, and has possibly made some small contribution to the task itself. It is, therefore, not proposed to enter at any length upon the details of the system here. For information, the reader is referred to the author's books *Scale Railway Modelling Today* and *New Developments in Railway Modelling*. In the not too distant future, there will without doubt be innumerable commercial examples of two-rail track and points on the British and the American markets, at a price comparable at least with the price of the older three-rail track. So far as rolling stock and locomotives are concerned, the insulation of these features is a simple matter that should really add no cost to the production of either such models or parts for their construction. There can be no doubt that the best method of insulating the wheels of locomotives is by using wheels that are made current-resisting at the rims. Several types of

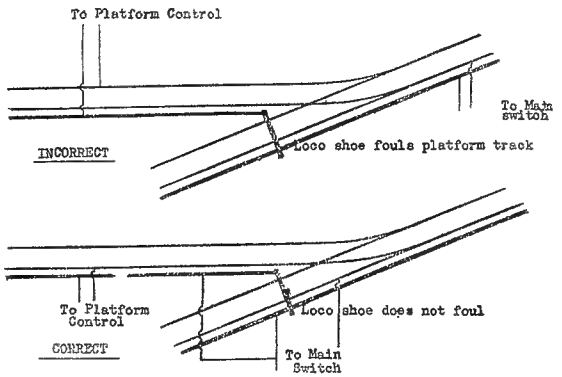


Fig. 55.—Avoiding passing contact.

these were on sale at Hamblings long before the war. For perfect pick-up, the wheels on one side only of the locomotive are so treated, and the wheels on the opposite side of the tender also. The positive is then taken from the frames of the engine for the motor, and from the frames of the tender for the negative element, the tender and engine being connected by a coupler that itself is insulated. For vans, wagons and coaches, wheels insulated at the hubs should be fitted throughout.

Another interesting novelty is the " Twin Train " set in OO-gauge by Bassett-Lowke Ltd. This is an ingenious contrivance whereby, through the introduction of the insulated-wheel system combined with three rails, two engines can be separately controlled while operating on the same track. This allows for the stopping or reversing of one engine while the other remains running, and also for the successful running of double-headed trains. The price of the sets is really most reasonable, and the workmanship and robustness of the mechanical details are excellent. The model train sets are a great improvement on earlier Continental

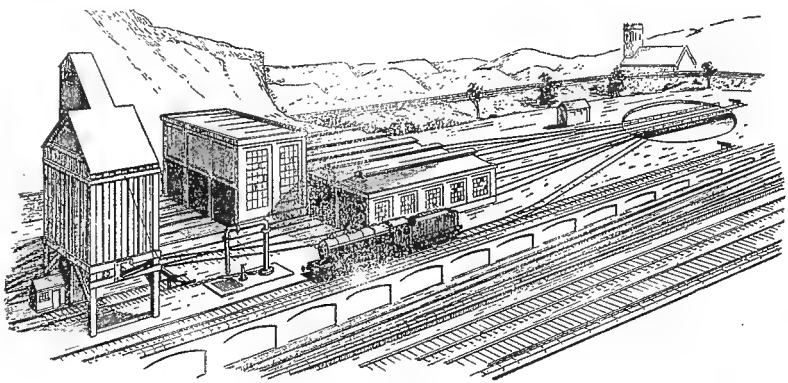
lines. It is highly probable that many skilful amateurs will devise clever adaptations of the models, which are by no means expensive, and can be purchased separately. There are locomotives, bogie coaches, and goods wagons representative of the L.M.S., L.N.E.R., and Southern Railway ; also control switches and a low-priced transformer giving 14 volts off a.c. mains. Incidentally, the equipment in buildings should be mentioned. These are a great advance on any miniature-gauge mass-production examples hitherto marketed, and are ingeniously desiged so as to lend themselves to fabrication. During recent years there have been many very acceptable developments in " Twin Trains," one of which is a striking Pacific locomotive model. The standard track has a raised Bakelite base which gives a perfect and clever system of insulation. With the exception of the motor in the locomotive the whole series is British made throughout.

For those who are less impressed by the scale appearance of their models than by their workability, the fame of the Trix series of miniature trains scarcely needs stressing. The proprietors of this line have certainly secured a fine percentage of working reliability coupled with at least a strong effort after realism, while many of the Trix adjuncts and accessories are most acceptable to the Trix enthusiast and the scale devotee alike. The workmanship and robustness of the mechanical details are excellent, and it is highly probable that many skilful amateurs will devise clever adaptations of these models, which can be bought separately. There are locomotives, coaches, wagons, and control switches. The " Many-Ways " buildings which are sold in conjunction with these outfits are most useful to scale workers.

One of the strong advocates of the Trix System is H.R.H. Prince Birabongse of Thailand, who has kindly furnished a brief description of his layout, and house photo, taken while engaged in operating his system, is included in these pages He states that he was won over to Trix by the fact that it is such a readily portable system, and by the practical character of its structure in general, and he continues, " At present I have a circuit laid on a platform raised about 3 ft. 4 in. from the floor. It is in the shape of two letters ' L ' joined by their tops. The system is a point-to-point single-line railway. It is a make-believe island somewhere not far from the mainland. To visit the island, one must go by a mail boat, which runs daily, or by an air-liner which lands on the airfield not far from the capital. I devised a special clock which runs roughly 24 times faster than the real time, so it can be imagined how time flies on this island. The termini are a port town station and the main station of the capital. The full journey takes passengers round the different parts of the island, making roughly a figure of three loops with two levels. The express non-stop train takes 55 mins. (by the island time) and it passes through six stations, not counting the termini. The engines and rolling stock are as follows : 1 streamlined 4-6-2 ; 1 (Princess class) 4-6-2 ; 2

(compound) 4-4-0 ; 5 tanks 0-4-0 ; 2 sets of express bogied coaches ; 2 sets of non-corridor coaches ; 1 push-pull set ; 42 various types of wagons and trucks and a breakdown gang complete with a 10-ton crane.

" I take delight in making up strict time-tables for various seasons and keep proper statistics of the smooth running as well as the rate of accidents. I am glad to say that with a single-line system confusion is reduced to a minimum and, as no buffer-locking ' disease ' is ever found with this system, the only time we have a derailment is when the signal man gets careless and throws the wrong company and the offenders are properly dealt with."



Locomotive depot and main line at Laurenceton.
(West Midland Lines, 1942.)

CHAPTER III

MODELLING RAILWAY BUILDINGS

WE now proceed from the somewhat technical subject of track work to the extremely interesting theme of how to construct the various types of buildings and stationary equipment for a model layout. Among all those who design and make the necessary buildings for their own use there are really few workers who have risen to what may be termed " the realistic touch." Many efforts depicted in the various photos in the periodicals reveal good and painstaking work, but how frequently it is true that some atmosphere of artificiality or " woodenness," or some obvious defect in finish, will spoil an entire picture ! Quite frequently, again, an excellent piece of architecture in miniature, which would otherwise be almost flawless, is ruined by the last finishing touches—the addition of a street- or yard-lamp, or tree, which completely spoils everything ! The convincing nature of model architecture and scenic work depends mainly, not upon the detailed perfection of execution so much as upon a certain " scale-sense " which ruthlessly rejects anything doubtful and meticulously observes and " takes in " what is to be seen in actual practice. It is, indeed, largely a matter of memory. The electric tramcar in Chapter VI of this book was drawn entirely from memory while the writer was on holiday at a small seaside town, whence it would have involved a journey of 30 miles to set eyes on one. But tramcars had been " noticed." And it is the faculty of noticing detail which probably gives the touch of realism to station and other work in railway modelling.

Necessary workshop equipment is certainly not lavish. A small table or desk, a good razor-knife and carpenter's square, a ruler with millimetres and inches, a set-square, pencil, compasses, a piece of sandpaper, a tube of Seccotine or (cheaper and most satisfactory) Certofix, and a few other improvised aids are all the necessities. Among these improvisations may be mentioned odd lengths of postal tube, certain square and circular cartons in which pepper and salt and patent medicines are obtained, wood-papers as used in all elementary schools, book-matches, card-strip as sold for picture-framing on the *passe partout* system, and last but most important, a roll of 50 yds. of adhesive parcel strip.

For cleaning artists' brushes and storing paints while mixed in small quantities for immediate use, I recommend discarded ice-cream buckets which are usually thrown away. These fit inside one another, and when washed are perfect for the task. They should be kept on store and may be thrown away after service. " Scale-coloured " paint of all the railway companies' standard colours may be had in tiny tins from the model manufacturers, particularly Mills Bros., the Leeds Model Co., and Bonds Ltd. Artists' oil-colours in small tubes are eminently

useful for odd shades, and Reeves' poster colours for use with water are the thing for scenery. An armful of disused umbrella rib will gladly be given away by most waterproofers, who will be thankfully rid of it, and this is one of the most useful commodities. Pieces of metal gauze, as used on radio sets, wooden discs, and conical caps as sold by Hobbies Ltd. and Handicrafts, lengths of bird-cage wire and pierced strip, and cellophane as used for wrapping chocolate bars, should be put away in the oddment box.

Cardboard is unquestionably the best of all modelling mediums for HO- and OO-gauges. It is light and portable, most readily worked, and cheaper than any other material. The best variety is white both sides, and smooth, and about $\frac{1}{32}$-in. or a little more in thickness. It can be had from bookbinders in any desired sizes of sheet.

Model architecture has been revolutionised by the introduction of the various series of building papers, which may be had to the author's design in great variety, representing old stonework, smoky brick, red brick, and about thirty other persuasions. The smoky brick variety includes also shaped arches, and an enterprising American manufacturer, Mr. Oliver Whitwell Wilson, of Yonkers, N.Y., has produced an entire series of such brickwork arches in paper, as well as proper window-sills. The brick-paper looks rather silly in sheets, but when judiciously set on small models and retaining walls, it is most convincing. The reader should also secure samples of the excellent scale brick-papers put on the market by Modelcraft Ltd., of Grosvenor Road, S.W.

In modelling walls in cardboard, do not proceed by the commonly mistaken method of half-cutting the wall and bending them over. You can never get a sharp satisfactory corner in that manner. Make the four walls of the building by cutting each piece separately, as in Fig. 70. The pieces are joined with parcel strip, leaving a space between each edge of the same width as the thickness of the material. You may then bend either corner to overlap its neighbour and thus greatly adjust your fitting. The parcel strip is so tough and thin that it will bear any strain and will never show through brick-paper or even cement paint. Fig. 56 shows the corner and floor of a building thus assembled, Fig. 57, the floor of a building with its four binding strips added. Form the whole of your building before you add any brick-paper, then proceed to cover one side at one time, gluing the paper with a piece of sponge or rag evenly all over. Window apertures should also be carefully cut before the brick-paper goes on. The paper is then stuck over the apertures and immediately cut diagonally on the sticky side (Fig. 66), and at once bent back over the edges of the window. This will give a brickwork finish to your window-sides. In fitting the brick-papers, cover the two longer walls first, overlapping the corners by $\frac{1}{2}$ in. Then set on the other two sides flush with the corners. Straight window-sills and door lintels may be had by cutting strips of brick-paper in the cross

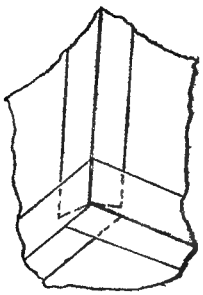


Fig. 56.

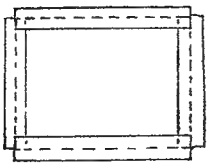


Fig. 57.

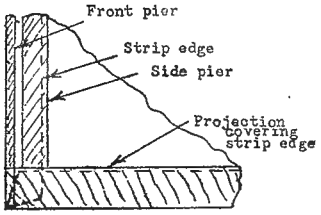


Fig. 58.

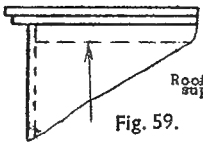


Fig. 59.

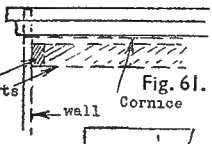


Fig. 61.

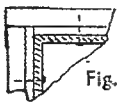


Fig. 63.

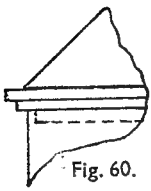


Fig. 60.

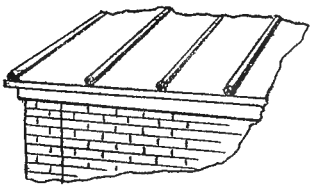
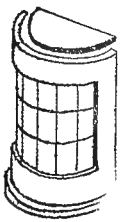


Fig. 62.

Fig. 67.



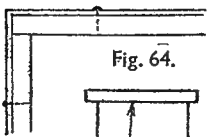


Fig. 64.

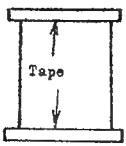


Fig. 65.

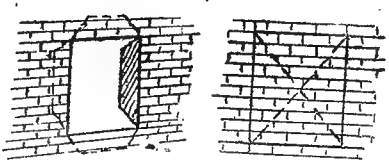


Fig. 66.

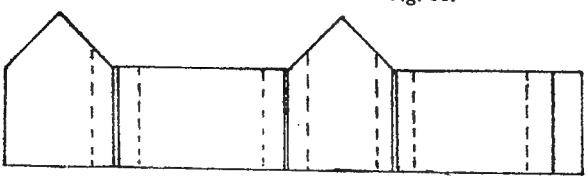


Fig. 70.

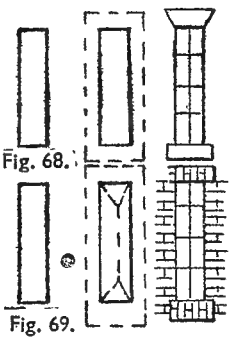


Fig. 68.

Fig. 69.

direction one full brick wide. Another method of forming sills of all kinds is that of Fig. 65, in which painted parcel strip is used and simply stuck on. Do not attempt to paint the strip after fixing it. Get a piece of old cardboard and attach a number of pieces about a foot in length to it by their tips. Paint these to various colours required—concrete, brown, grey, white—and keep them on stock. Few things are more useful. For finishing a building for concrete the best paint is known as flat-drying dove-grey enamel. In Fig. 68 we have the idea for forming a glass window on a concrete wall. The painting is done before the thick celluloid or glass is attached to the inside, with parcel strip around the edges. Then the celluloid sashes may be added. Fig. 69 shows how to make a window in brickwork. The brick-paper is first glued over the edges, then the " glass " added, then the sills. An ornamental circular bow window, made from a piece of postal tube, is shown in Fig. 67.

Roofwork is carried out in a variety of ways. Consult Fig. 71 for a typical plain hip roof made up like the walls. Here the length of the eaves is most important. A ridge of metal valance may be set in a slot made by cutting the tape along the ridge, the hidden part of the valance being cut and bent in alternate directions, afterwards being stuck with glue or tape in place. A triangular supporting soffit may be fitted. Fig. 59 shows the method of making the flat support for the same roof, which consists of three thicknesses of card, the lower fitting as a soffit inside the walls. This is glued in place after drying under pressure. Such a flat surface may be finished as a flat roof, with lead rolls (Fig. 62) if desired. Fig. 60 shows the hip roof attached.

Sometimes it is necessary to fit plinths and pilasters on the corners of a station building. These can be so arranged as to cover absolutely the overlaps of parcel strip (see Fig. 58). Buttress section wood may be had ready cut to size from G. N. Slater, as well as a great variety of cornice strips. If a sunk flat roof is desired, follow the method of Fig. 61. In this instance the flat card soffit is made to rest on stripwood supports inside the walls near the top, and the outer edges of the walls have other stripwood lengths to form cornices, a broad strip beneath a narrow strip. In a brick building the cornice thus formed is painted for concrete. The plan of the same roof corner is in Fig. 63. In Fig. 74 we have a method of fitting umbrella rib (cut with a metal saw) to form gutters. The rib is soldered to the tips of lengths of cage-wire slotted through holes in the building and passing from one side to the other. A down-pipe is represented by soldering a length of cage-wire to which tiny cardboard lugs (postal card) are glued (Fig. 77). Guttering may also be formed of OO-gauge rail, bent to fit tightly around the eave and first drilled for fixing-pins in the web. In Fig. 93 we have an example and another type of down pipe. Umbrella rib also serves splendidly as a rounded parapet for a brick wall, either painted for concrete

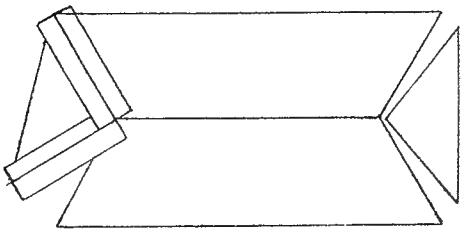


Fig. 71.

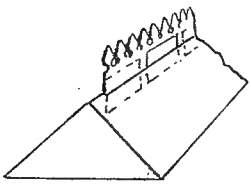


Fig. 72.

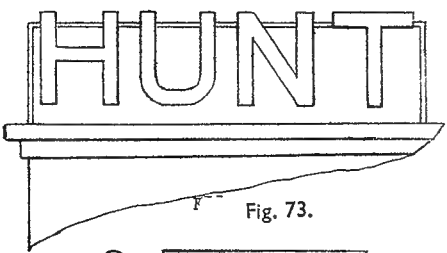


Fig. 73.

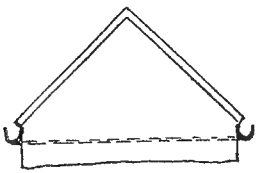


Fig. 74.

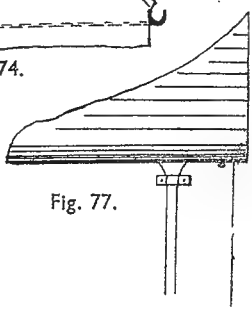


Fig. 77.

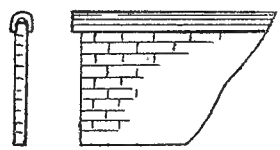


Fig. 75.

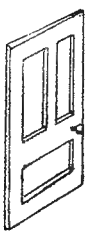


Fig. 76.

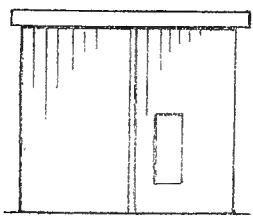


Fig. 80.

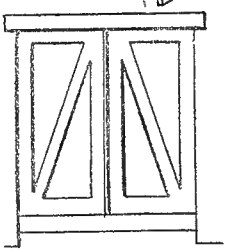


Fig. 79.

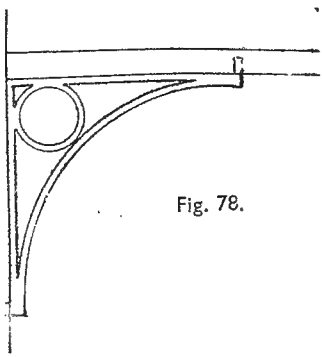


Fig. 78.

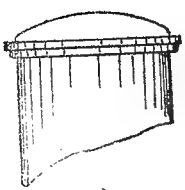


Fig. 81.

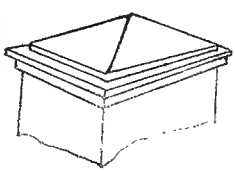


Fig. 82.

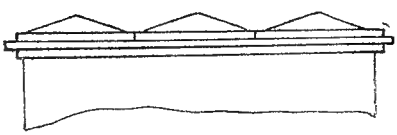


Fig. 83.

or covered with brick-paper after gluing in place (Fig. 75). Very tiny roofs, as for station kiosks and subway entrances (Fig. 83), may be made by sticking on the top of the building small concave or conical caps used in fretwork and cabinet-making and sold by dealers. Figs. 81 and 82 show two kinds.

Small doors of standard type are made by cutting out a mask, minus the panels, and sticking it over the cardboard body of the door (Fig. 76). Double doors with postern as Fig. 80. It is advisable to consult the lists of G. N. Slater and of Albert Kenyon for excellent doors of all kinds—plain, panelled, glazed, single and double. In Fig. 79 we have a novel suggestion for double-strutted doors, either for a factory or an HO engine shed. The outer framework is made from metal castings as sold by Bassett-Lowke for O-gauge vans. These are actually lighter and more dainty than the sketch, and have more details, and a dozen can be had quite cheaply. They are too small for OO-gauge engine sheds unfortunately. The door body should first be lined out for planking.

Very many models are spoilt by improperly formed skylights. Not one man in a thousand has ever noticed what a skylight in glass is like. The great mistake is to add a sashbar along the bottom, making the skylight like a window lying at an angle. Fig. 85 gives the correct method. The glass or celluloid should first be covered around the edges with light-coloured tape to form very fine end-bars. It is then stuck over the aperture and the sashes added before the ridge coping has been stuck on. Occasionally it is desired to have a roof hinged so as to lift for access to the inside of the building. This may be accomplished by forming the roof of entire pieces of glass, and covering this with slate-paper, leaving an aperture for the skylight. The method is then as in the foregoing instance. A strong piece of adhesive linen tape should form the under-ridge between the fixed roof and the hinged side—but be sure to leave out all sashwork along the base of the skylight!

Louvred roofs for locomotive sheds are nicely made from Dennisons' $\frac{1}{2}$-in. card-strip. A cheaper material, almost as good, is sold in lengths ready-cut by Messrs. Samuel Jones & Co., of New Bridge Street, E.C.4. Two ideas are given in Figs. 86 and 87. In the first the louvred section fits at an angle over the ridge, the base being made up of card and the louvres built up one above the other flat. The shaped top is a piece of Handicrafts' wood angle-strip, $\frac{3}{4}$ in. wide across the base. In the other type the roof is made with a flat ridge just wide enough to take the louvres.

In modelling ornamental buildings one, of course, reaches the point when real refinement is needed. Fig. 89 shows how a built-up tower is made, as for a model church, and how to insert a projecting cornice. The edges of two perpendicular dormers are also shown. In Fig. 90 we have another improvisation, wherein is employed a tent-maker's eyelet of fairly large size to form an ornamental circular

window, which need not be glazed. Another window, this time with a cardboard surface, is shown in Fig. 97. The whole is executed in cardboard, but a metal washer may form the circular front if desired. These are not easily obtainable in correct sizes. Three types of chimney are given (Figs. 91, 92, 94). For chimney pots use empty cartridge cases of very small calibre. An excellent finial for a spire is made from an O-gauge or 1-gauge signal finial (Fig. 95), and in Fig. 96 a finial is shown as made from the foot of an alarm clock with a sprig soldered to the top for a finish.

There are a number of O-gauge fittings which may be worked into OO- and HO-gauge buildings. As an example, see the O-gauge signal-post bracket in Fig. 78. Here it serves to support a very large canopy not frequently modelled. But in Fig. 98 I give a few other more pertinent notions as to the use of this fitting.

Cardboard buildings should always be reinforced with stripwood, either visible or concealed. Figs. 61 and 63 are typical. In Fig. 64 we see how to sprig the cardboard sides of a building having an open base (perhaps to cover some mechanical appliance) to the stripwood inside. The little sprigs may be squeezed with the pliers through the wood and cardboard after the two have been glued. To coat a finished model with shellac before putting on the brick-paper or paint is excellent—and this remark applies in particular to wagon bodies.

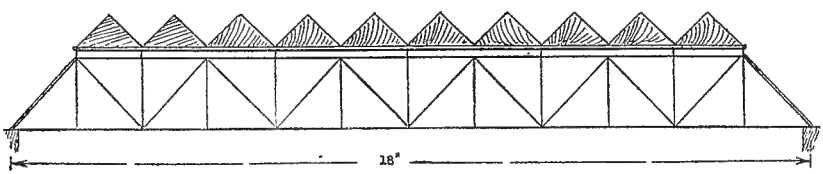


Fig. 84.—Station roof of rail and wood angle.

A few words on small soldering work. It is a pity that so many model men are afraid of a soldering iron. There is no work more pleasant and nothing much easier after practice. Use an electric iron, which consumes scarcely any current, and which will save hours of work and time. The best fluxes are the liquids: either Fluxury or Baker's Fluid. Numerous models can be made from fine wire and pins: a number are shown in Fig. 100. These are all made from pins before removing them from the papers in which they are bought. A to C are telegraph poles made by soldering a length of $\frac{1}{8}$-in. copper wire across the pins and afterwards removing the papers and snipping the ends of the pins off. D is a ladder for signals, cranes, etc., though a perfect scale ladder is now to be had from Hamblings. E is a model ship's shrouds. F is an ornamental palisade and gateway, the posts and horizontals being of stouter metal such as busbar and tram-ticket brass strip. G is a crane-jib for a breakdown crane; I is a girder for under a signal gantry; J is a handrail;

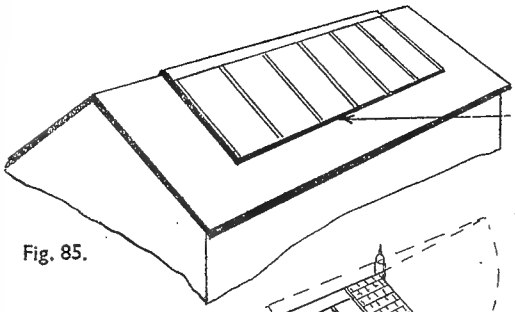


Fig. 85.

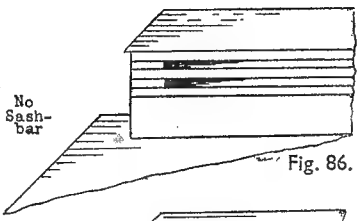


Fig. 86.

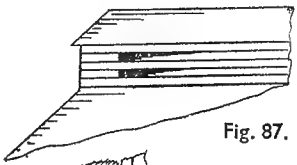


Fig. 87.

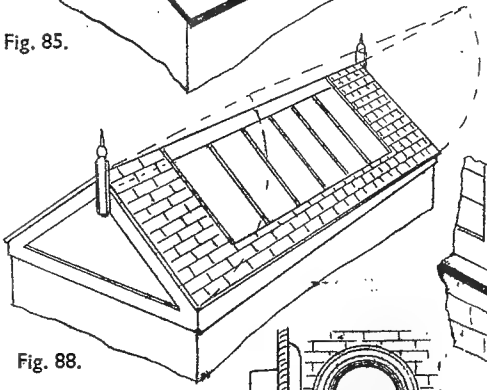


Fig. 88.

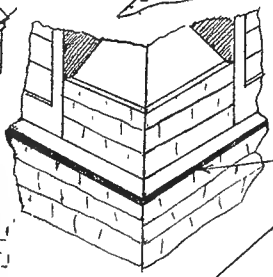


Fig. 89.

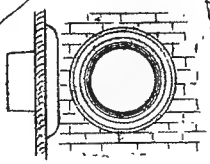


Fig. 90.

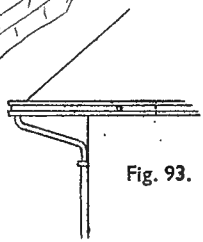


Fig. 93.

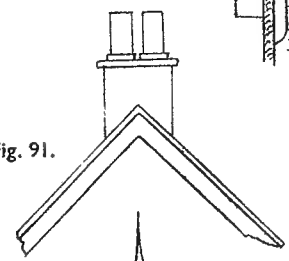


Fig. 91.

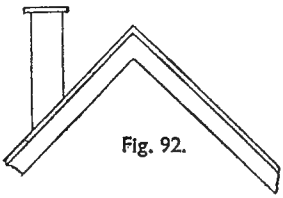


Fig. 92.

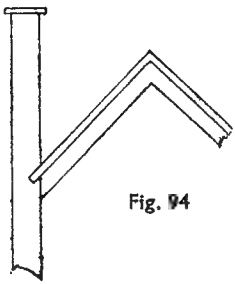


Fig. 94

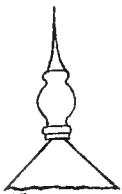


Fig. 95.

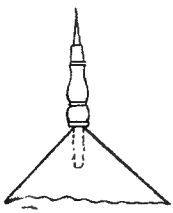


Fig. 96.

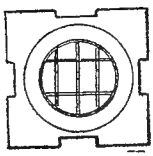


Fig. 97.

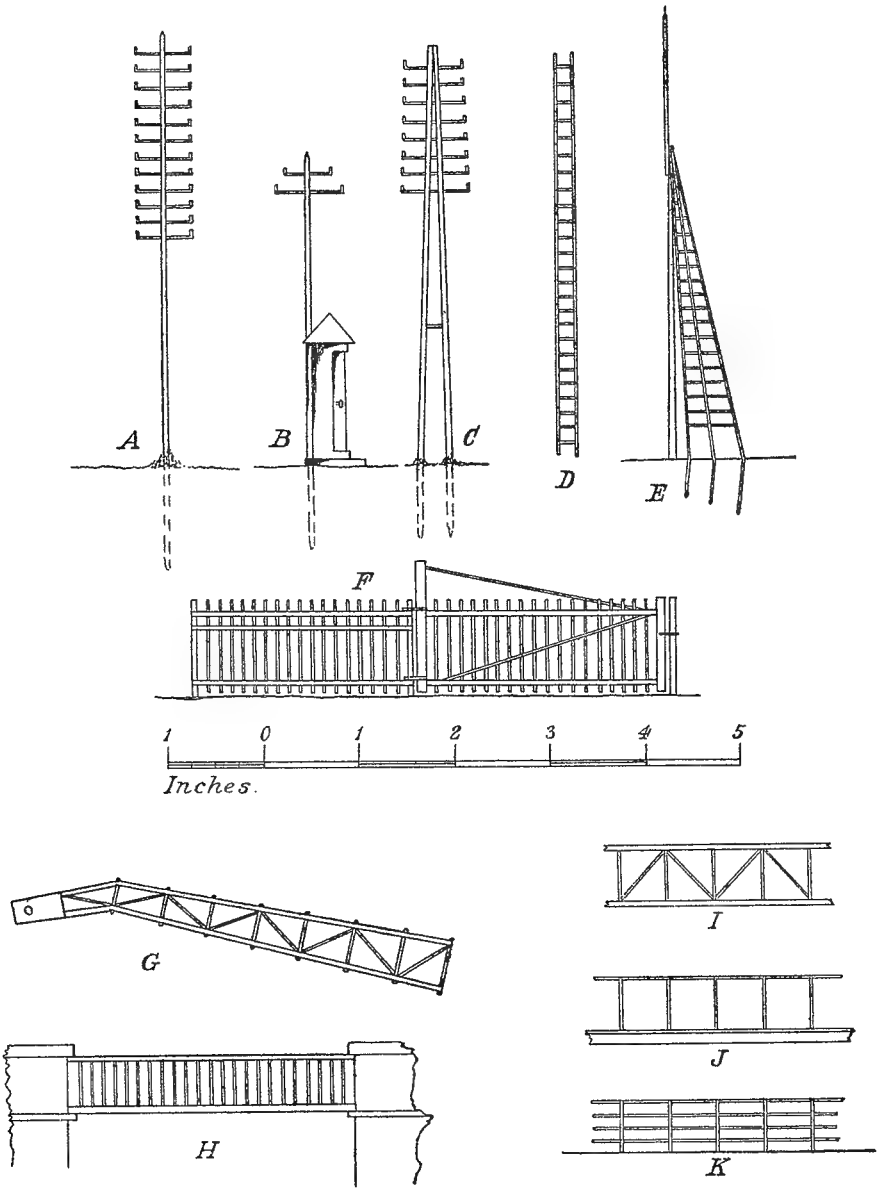


Fig. 100.—Various models and parts made with the aid of pins in paper.

K shows the handrails for a ship. In these latter instances some of the pins are removed systematically from the papers before soldering begins. H shows an ornamental bridge side girder. But these by no means exhaust the list of the useful fittings which pins will furnish with the aid of a little patience.

The uses of OO-gauge rail for structural purposes are legion. Not only for guttering but for bridgework, turntable girders, crane construction, and all manner

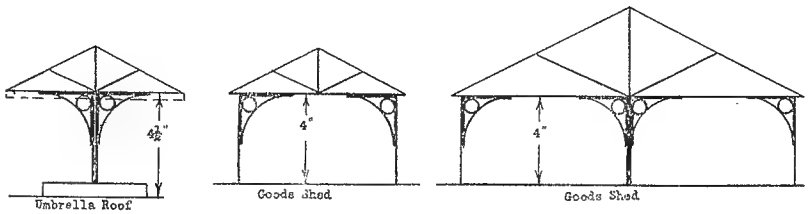


Fig. 98.—Use of O-gauge signal brackets.

of imitation steelwork this material is invaluable. In Fig. 99 two ideas for arched roof trusses suitable for small covered stations are given. A fine template for the curve is a common coat-hanger, which should be fixed down to the bench. The rail is soldered in place on its edge. These girders may be bought ready-made from an advertiser, but they may also be easily made by the amateur himself.

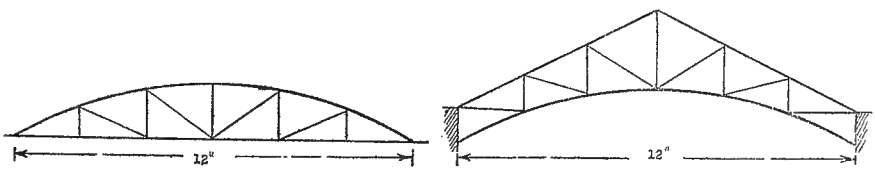


Fig. 99.—Rail-made roof trusses.

The idea embodied in Fig. 73 is that of forming lettered roof-signs from the brass letters which are sold by Handicrafts. These are simply soldered on to a wire bearer attached to roof or cornice.

A more ambitious suggestion for a station roof is given in Fig. 84. The trusses are made of rail as already described. Above these there is attached a sheet of cardboard or thin plywood, perfectly flat, to which the roof sections have previously been glued, these consisting of angle stripwood as sold for the woodworking hobby. The roof sections are covered with slate-paper and the truss ends left open as shown. There is no better way of fashioning small roofs of this kind, whether for stations, goods yards or locomotive sheds.

Where it is not desired to use the printed sash-papers for window-work owing to the need for transparent windows, and if the forming of sashes by means of

paper-strip is considered too detailed or tedious for very large window surfaces, there is another scheme which is, perhaps, superior to all others, and which involves the minimum of labour. Lay a sheet of " Merco " sash-paper on a sheet of smooth cardboard. On the surface of this paper lay a sheet of somewhat stout celluloid, such as motor mechanics use for screenwork. This may be as large as is desired. Square up the sash-paper with the edge of the cardboard sheet and pin the whole with drawing-pins (two only) near the top. With the aid of a set-square or joiner's square and some kind of blunt but harsh instrument—the burred end of a small round file is good—proceed to scribe lines on the celluloid over those of the sash-paper. See that every line is regular and that the surface of the celluloid is all the time peeled off by the scriber. Having done all the upright lines, go on to the horizontals, being careful to keep exactly over the sash-lines. On removing the celluloid you will find yourself in possession of an excellent and permanent sheet of correctly produced windows. These are admirable for use on passenger stations, where it is essential to have large glazed surfaces of a symmetrical kind. The celluloid is, of course, attached inside the walls of the building, and the window apertures must be arranged to take sizes which are multiples of the sash-paper squares, the apertures also being spaced so that one sheet of celluloid will serve for an entire building side : that is to say, if the sashes are $\frac{1}{4}$ in. wide, the brickwork between the windows must be in multiples of $\frac{1}{4}$ in. they will be $\frac{1}{2}$, $\frac{3}{4}$, 1 in., etc.

There is a tiled ridge-paper to be had in the " Merco " series, and this can be used to make an excellent finish to the ridge of any ornamental building. A strip is cut to the requisite width, glued, and fixed down over a length of $\frac{1}{16}$-in. wire along the peak of the roof. The ends may then be finished with some form of a finial. Kenyon, of Bradford, and Slater, of Timperley, sell finished roof strip, for ridges in several colours and by the foot length.

CHAPTER IV

BUILDING AND EQUIPMENT DESIGNS

HAVING now disposed of the details of structural work involved in railway modelling, we may proceed to consider the actual designs of the equipment to be modelled. We shall endeavour to confine our attention systematically to passenger, freight, and locomotive depots, afterwards proceeding to the subjects of docks and factories and general trackside features.

We begin with the two simple station buildings of modern type in Figs. 101 and 102. The first is a building for facing the public highway on one side and the platforms on the other. The sashwork for each wall is in one piece, one row of lower window-sashes being arranged to come below the canopy. The roof is flat with leaded rolls, and very simple. The lettering along the canopy is taken from the " Merco " sheet of station signs, the front of the canopy should be blacked before the sign is attached, a line of indian ink being run along the edges of the paper after it is affixed. The time-tables are from the same sheet. The name of the station may be made up from single paper letters as formerly retailed, or $\frac{1}{8}$-in. wagon transfers may be used. The best finish for the building is new red brick, the roof being painted dark grey. The second station is similar, but has an additional extended veranda concourse and a clock—the latter also from the " Merco " station sheet. The small louvres are drawn in ink on a piece of coloured strip. The coping under the gutter is of concrete-painted strip-paper. The first building is greatly enhanced in appearance by covering the inner walls with glazed white brick-paper.

The next design is the one promised for the station layout plan (Fig. 23), and is of the low level highway approach type. The sashes for the ornamental windows have the lower horizontal sash-bar omitted in the process of scribing. The spout-heads under the gutters are small blocks of stripwood. The finish of the building is in concrete paint, and the lined columns are done in indian ink. Cornices are of stripwood. For the small box girder bridge the girders are formed of either card or thin plywood, with strips glued on for the plates. Small details will be described in their turn. The roof, it will be noted, is of the parapet type and is sunk into the walls, where it rests on horizontals. The sloped series of circular windows suggests an ascending stairway from low level to high. The retaining wall may also be finished in concrete, and it extends the full length of the nearest platform.

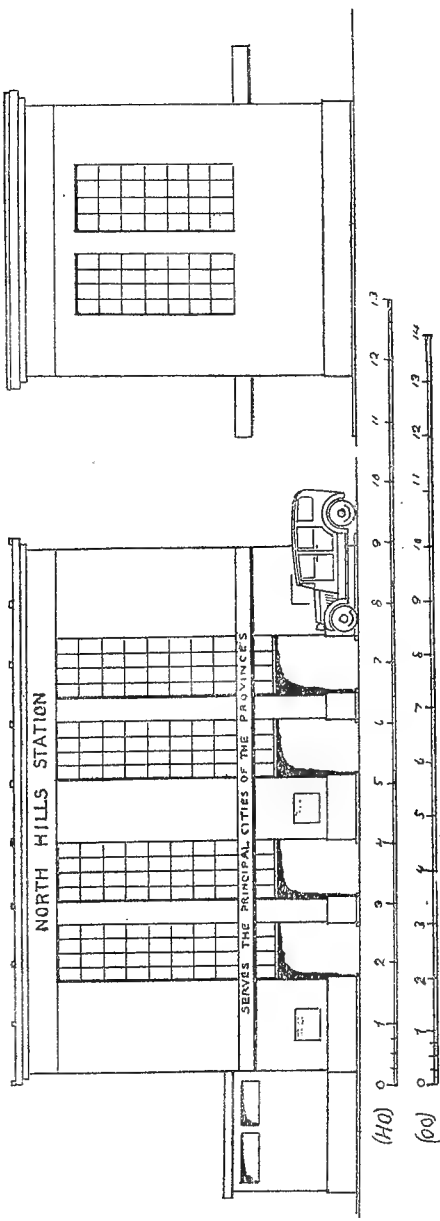


Fig. 101.—Simple station building.

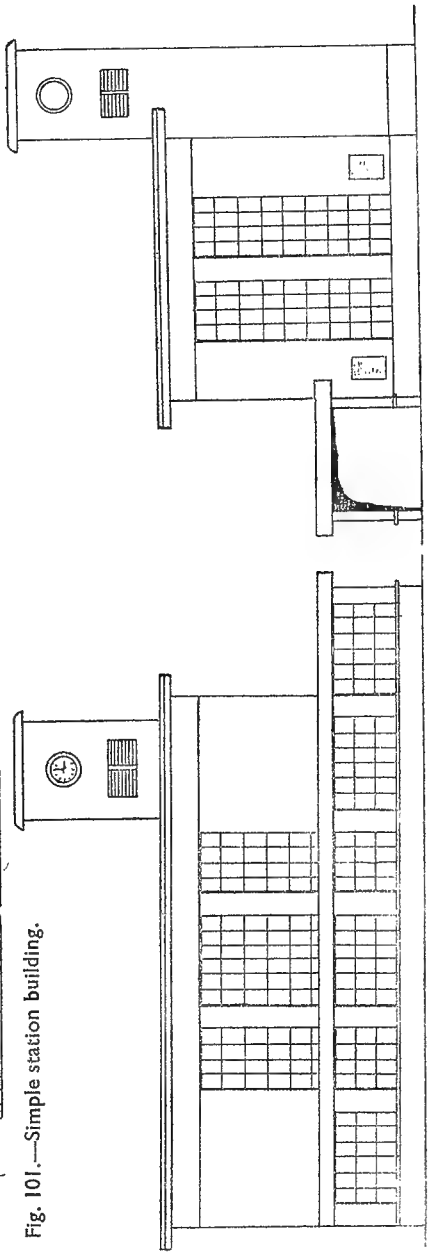
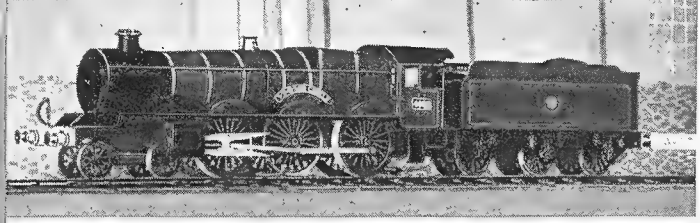
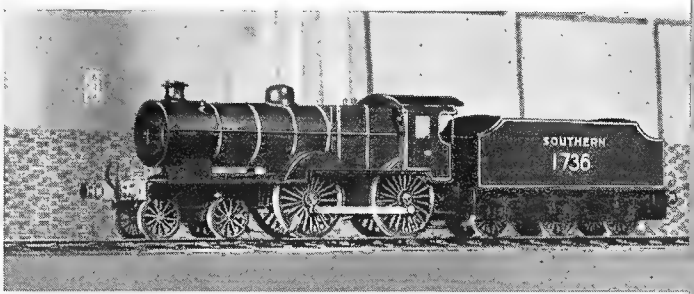


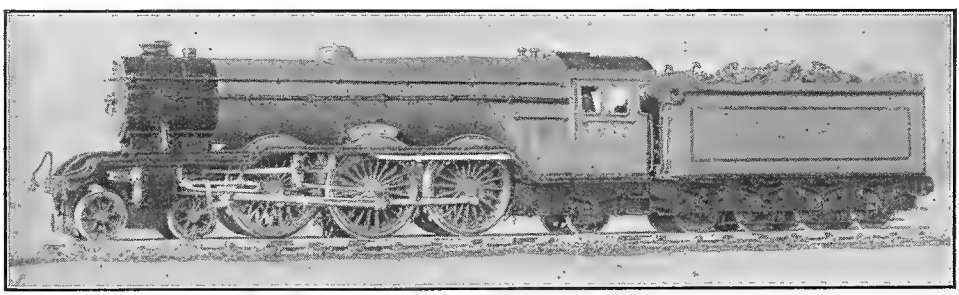
Fig. 102.—Station building.



G.W.R. "Castle" class in 4-mm. scale, by A. W. Hambling & Co.

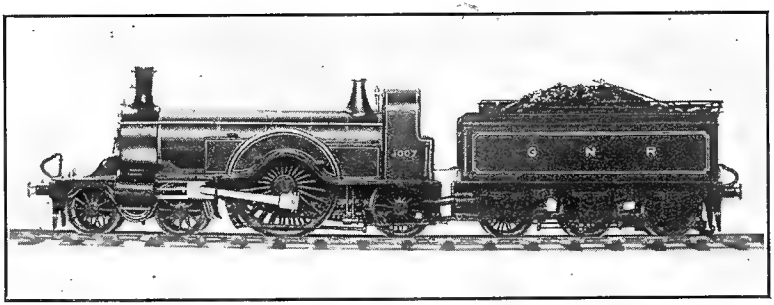
Southern Railway "L1" class 4-4-0 in 4-mm. scale, by A. W. Hambling & Co.

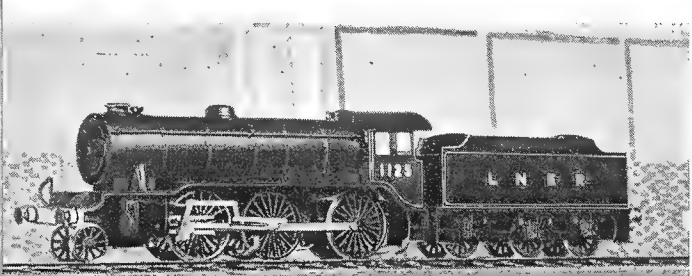




L.N.E.R. "Pacific" by C. E. Mellor.

Stirling Single, by Walkers & Holtzapffel.





L.N.E.R. "Mogul" in 4-mm. scale, by A. W. Hambling & Co.

Above : Taff Vale type 0-6-2 tank as originally running, and below as subsequently converted.

A station of the arched roof kind is shown in Figs. 104, 105 and 106. The interesting feature in this design is that the arches, of which there may be any convenient number, are formed of cheap coat-hangers. The end screen is glazed, lined celluloid being the material, and makes a very convincing and attractive finish. The top of the roof is also similarly treated, but the sash-lines are vertical only, the horizontals being left out. The trusses rest upon a beam running the entire length of the train-shed and resting on shaped upright supports so that the roof lifts off in one piece. There are four of the corner columns, but the two at the opposite end may be rather plainer if desired. The concourse building for the farther end is in Fig. 105, while Fig. 106 gives a sketch of the side elevation of the same building. The dormers may consist of pieces of plain stripwood, 1 in. by $\frac{5}{8}$ in., forced into holes in the slated roof and securely fastened in place. They are then covered with various papers for the requisite finish. These projecting pieces of wood inside the roof may all rest on one cross-batten underneath, to which they should be glued. The finish of the front of the building may be carried out in "old stonework" paper, the arches being made up of short pieces cut across the bonding. All columns should be of solid wood, which is more substantial and more quickly made up. The discs for circular windows are of cardboard, but metal washers would provide a better finish. These may be drilled and fixed in place with short pins, cut off on the inside after passing through a similar washer on the inside. If metal washers are used, these pins may be touched with solder.

A number of items for the furnishing of station platforms are next illustrated. The telephone booth (Fig. 107) is made from a glass phial, formerly containing aspirin tablets. The top is the metal lid, the base is made from a discarded wagon wheel stuck in. The inside is covered with a piece of sash-paper and the outside with a paper mask having an aperture for the door which exactly fits over the sashes. The mask is painted cement-colour before fixing. The sign is from a "Merco" sheet. The other booth (Fig. 108) is made up of celluloid strips on cardboard soffits, bound together with a paper mask glued on. The top is a square of thick card. The inside is lined as before. The baggage trolley (Fig. 109) is made of rail soldered around a piece of tinplate cut exactly rectangular, and the wheels, pivoted through bearings of bent rail soldered on, are Leeds O-gauge wagon brake wheels. The other barrow (Fig. 110) is made from O-gauge ladder. Two covers for the wheels are soldered on as shown, as well as a pair of supports made of flat wire. The station clock (Fig. 111) has for its foundation an old Holtzapffel solid wheel (wagon type), and the clock face is "Merco." Lamp standards for platforms (Fig. 112) can be worked up from correctly-shaped glass beads from Woolworth's. The lamp holder is a shoemaker's eyelet filled with fine dowelling, a pin forced through the bead and the wood, and soldered to the wire column. The wire for all the lamps for the stations should be shaped together

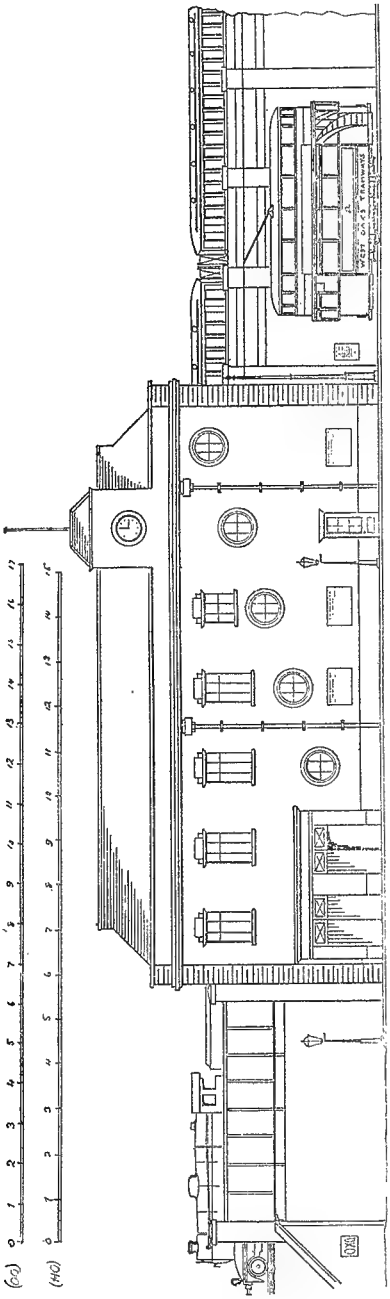


Fig. 103.—High-level station with low-level street approach.

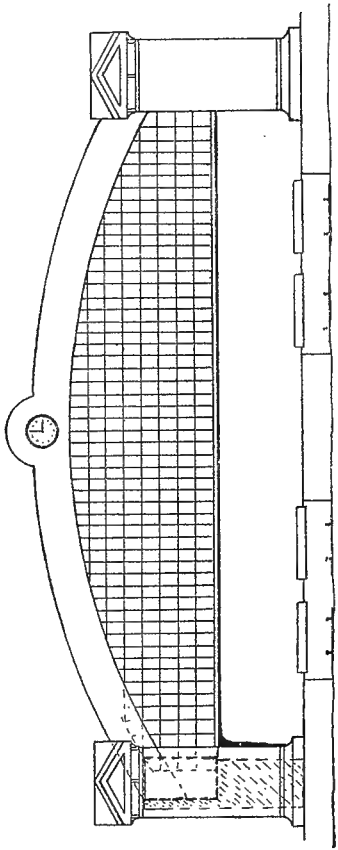


Fig. 104.—Arch-roof covered terminus station building (track end).

so that they may be exactly alike. The base is a piece of Rawlplug or a roll of parcel-strip. Posts may be painted blue or green enamel, lamp tops flat white, and these models are very effective. The two barrows (Figs. 113 and 114) for filling passenger-train water tanks and for retailing ices are soldered up from wire, with the aid of short pieces of dowelling, the wheels being the same as for the luggage barrows. Sweetmeat and weighing machines (Fig. 115) may be made of stripwood, etc. The multiple chocolate machine is best made from strips of brass section, the back being sawn out of a piece of sheet brass and the front parts being built up. These platform machines could be had to scale from Hambling's and are excellent products.

A most effective bookstall may be made from card as shown in Fig. 116. Start by making the shelves of books. This is done by sticking vertical strips of coloured paper, very narrow, about $\frac{1}{32}$-in., in alternating colours running through for about six shelves, each strip close to its neighbour. Now cut from the card on which the strip is stuck three pieces to cover the three respective shelf spaces. Then add the shelves, which should consist of finely-grained woodpaper strips. Include, also, a narrow surround for each series of shelves, and then with indian ink black in the spaces at the tops of the books. This should be done systematically but with irregularity. The body of the stall is made of cardboard, with apertures for the counter and bookshelves. The cornice is carefully cut to the plan and stuck in place. There is a glazed panel in the door, the knob of which is a common pin. The counter is fixed on supports at a slope. Then the whole is covered with wood-paper to match the shelves. The shelves next go into place. On the counter and hanging over it are numerous magazines and newspapers, consisting merely of cardboard squares cut from $\frac{1}{4}$-in. framing-strip, with a top cover of coloured paper for each pile, the piles being a little irregular. The newspapers suspended are of coloured paper with inkmarks to represent print and pictures. The roof is flat, with rolls, and is let into the walls for an $\frac{1}{8}$-in. parapet. It is painted grey before fixing. The adverts. are all from the " Merco " sheet, the corner ones cut from the sheet supplied for O-gauge. The *Punch* advert. is from the cover of a book of stamps. A bookstall, to be built up from a lithographed sheet, is one of the series of OO-gauge railway models designed by the author for Modelcraft Ltd., Grosvenor Road, London, S.W. A. W. Hambling & Co., Charing Cross Road, have a good range of OO-gauge platform details, including auto-machines, luggage barrows, etc.

Next we have a number of ideas for station advertisements. The display board (Fig. 117) is made of cardboard mounted with card-strip, to suit the size of the series of miniature Oxo adverts. The board should be painted black before the pictures are affixed. Both sides may be alike if desired, and its place is the centre of a large platform. The small Oxo sign is made of brass rail soldered around a piece of card, with two wire posts. Fig. 119 gives an idea for fixing an advert. on

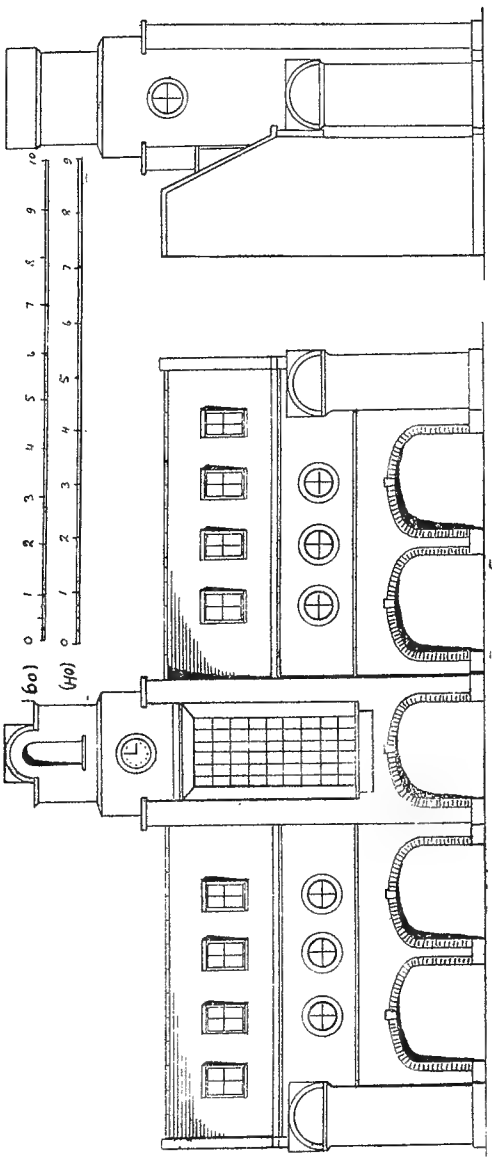


Fig. 106.—Side elevation.

Fig. 105.—Front elevation of arched-roof station.

a square column ; Fig. 120 shows the position for a platform-edge display. There are a number of useful series of miniature adverts. suited to HO- and OO-gauges on the market, and the smallest series, by Bassett-Lowke, should not be overlooked, though properly for O-gauge. There is a good set of Bovril station signs in the "Merco" series. But the best adverts. come from domestic sources, such as the covers of book-matches and stamp books, Oxade boxes, chocolate bars, trade circulars, and so forth. These should be carefully culled and collected.

Platform edges are finished in a variety of ways, but perhaps the most realistic method is to paint the platform dead-black and then affix along the entire edge, including the ramp, a $\frac{1}{2}$-in. strip of parcel tape, painted concrete colour beforehand. This is lined out with a pencil to suggest paving-stones (see Fig. 125). The front edges of platforms are most effectively finished with smoky brick-paper, though other papers may serve. The style should match the general style of the station architecture.

The best material for all platforms in the smallest gauges is solid wood, with ramps tapered off 3 in. from the end.

In Fig. 123 we have a design for a tobacco kiosk made from Holtzapffel's O-gauge metal telephone booth, which is cut down with a sharp knife, being soft metal,

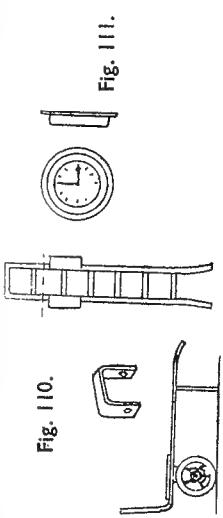


Fig. 110.

Fig. 111.

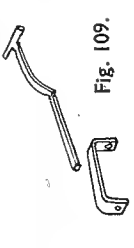
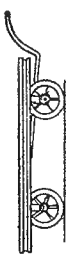


Fig. 109.



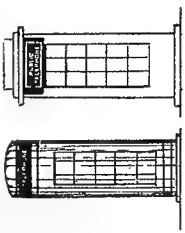


Fig. 107.

Fig. 108.

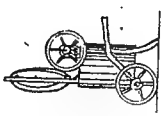


Fig. 113.

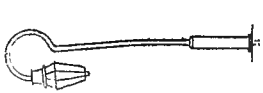


Fig. 112.

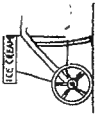


Fig. 114.

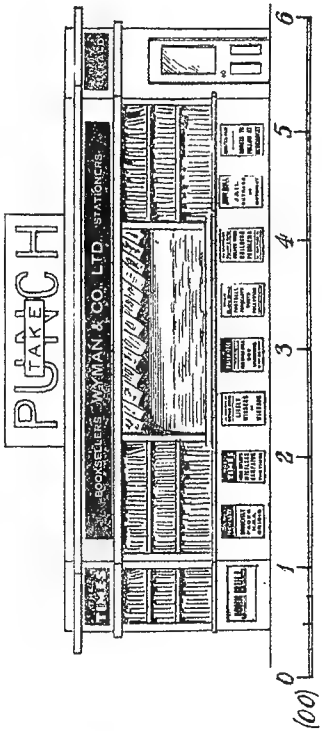
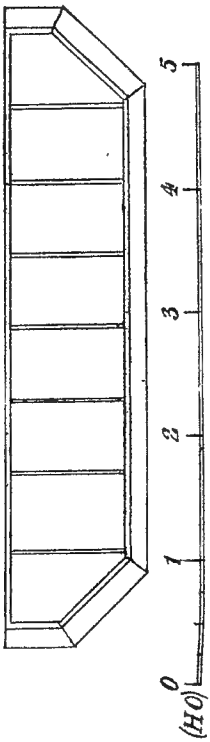


Fig. 116.—Station bookstall.



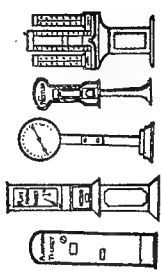


Fig. 115.

as shown. It is then painted concrete all over and the racks of cigarette boxes added in much the same way as the books on the bookstall. The canopy is cut from cardboard. The signs are from cigarette boxes and from the " Merco " sheet.

Card-strip is useful for forming footbridge stairways, as Fig. 124 depicts. A type of ornamental pin fencing (Fig. 126) for use on station platforms is also

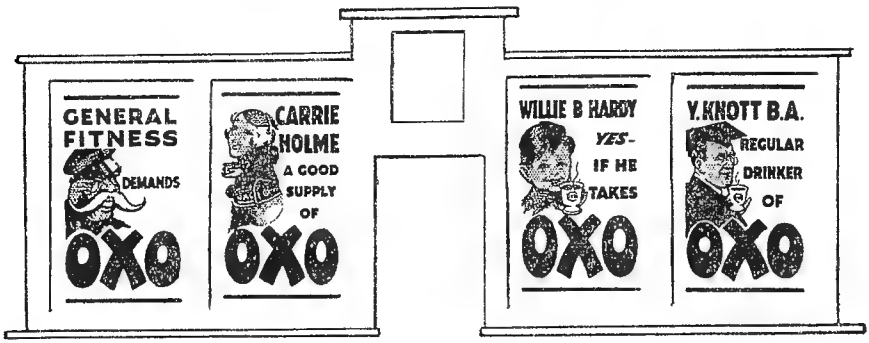


Fig. 117.—Platform hoarding.

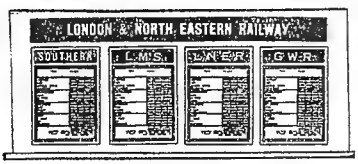


Fig. 118.

Fig. 119.

Fig. 120.

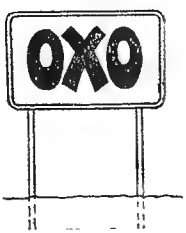


Fig. 121.
(Scale as on page 63.)

Fig. 122.—Train indicator.

indicated. The station seat (Fig. 127) is soldered up from fine brass-strip and bent to shape. The simplest type of station footbridge, so far as style is concerned, is the plain level-span bridge illustrated in the sketches (Figs. 128, 129 and 130). Unless the builder is a skilled worker in metal, he will find it well-nigh impossible

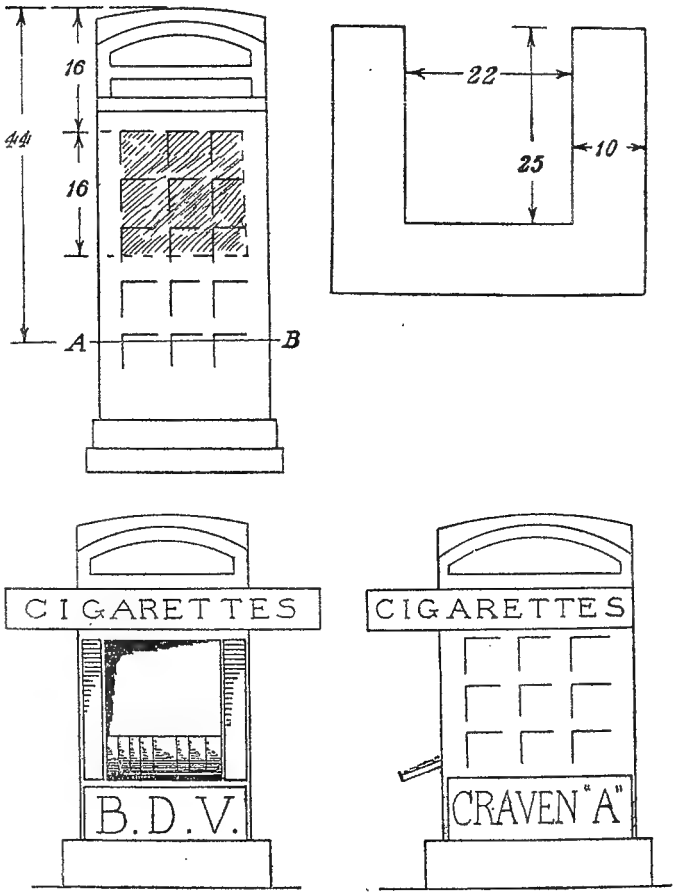


Fig. 123.—Cigarette kiosk.

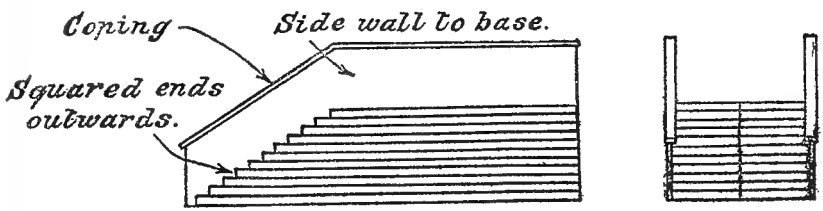


Fig. 124.—A staircase for a OO-gauge over-bridge made from card-strip.

to secure the shapeliness and symmetry of those short transverse sections of stairway forming the arched type. The level span is just as common in actual practice, and equally modern, and it may be built to represent either concrete or steelwork. Cardboard or thin plywood is used in the former instance (Figs. 128 and 129), and mosquito window-netting with umbrella-rib framework may be employed for the lattice type. The gauze is cut at the diagonal and fits inside the

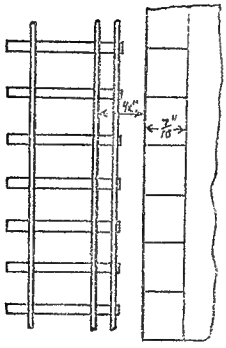


Fig. 125.

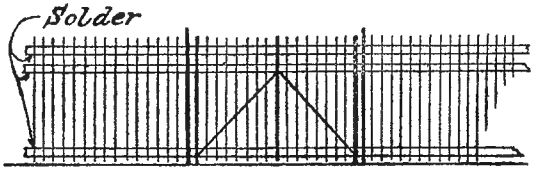


Fig. 126.

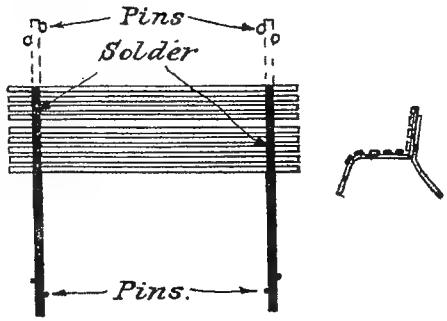


Fig. 127.

grooves of the rib, where it is attached by upright strips of fine brass, soldered in place. The stairway handrails may be similarly executed—though it is a ticklish task—or, if preferred, a simple rail handrail may be given to the stairways, as in Fig. 130. For fixing the stanchions for this handrail a good method is to drive pins into the sides of the stairway, soldering fine brass-strip to these vertically. If desired, the pins may pass right through the base. After the stanchions are soldered the pins are snipped off flush and trimmed with a file, when they will be almost invisible. A plain concrete footbridge is shown in one of the photos.

The interesting subject of goods-yard equipment is next in order of treatment. An effort has been made to furnish two or three designs for goods sheds which shall be fresh and original. The first of these (Figs. 131 and 132) is an open type with a form of loading bank common in country districts, though never yet to my knowledge modelled. One end of it is raised to the top level of medium wagons, so that loads of produce like potatoes in bulk may be tipped directly into the vehicles. For this purpose the opposite end of the bank should have a somewhat

gradual ramp for carts and barrows. The shed is built with a cage-wire framework, O-gauge ladder being used for a strengthening lattice at sides and ends. The bases of supporting pillars are O-gauge tapered chimney-pots in brass, which will be found ready drilled. The brass bushes off " Merco " bogies will also serve. When the framework has been carefully erected and soldered up, the roof of cardboard is added. This may be effectively secured by long strips of parcel-paper under each roof truss. The yard crane illustrated can be conveniently made from a Skybird series anti-aircraft gun base. The barrel of the gun is removed and a jib of $\frac{1}{8}$-in.

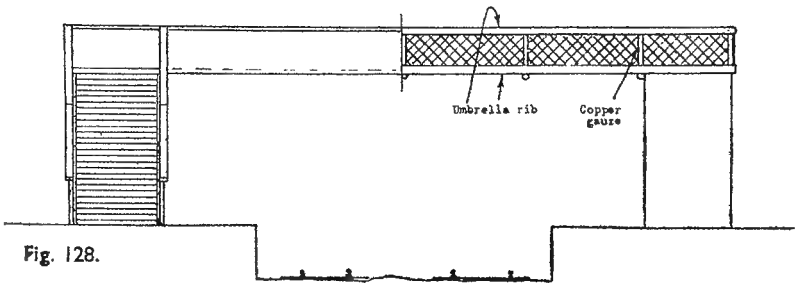
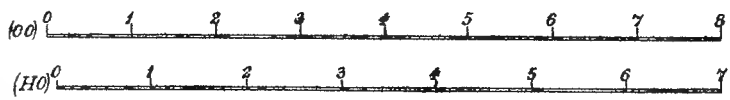


Fig. 128.



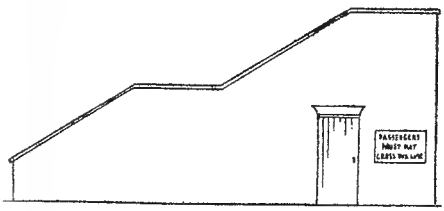


Fig. 129.

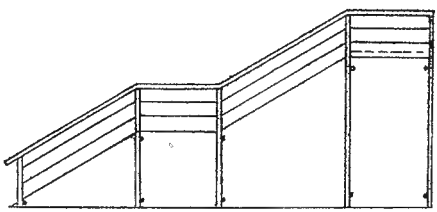


Fig. 130.

square brass is soldered to the base front. A clock or watch wheel completes the mechanism. A Leeds O-gauge signal pulley is attached to the top of jib as shown, and a length of 20-link ship's chain is provided with a hook and soldered to the axle of the mechanism. A hole is then drilled through the middle of the base and the dummy crane screwed in place. It makes an excellent model. For a derrick type of crane, made in $\frac{1}{8}$-in. strip brass, consult Fig. 135. A good chain weight is made from a " Merco " bogie bush or from a solid brass bead obtainable from Grays. The loading bank is finished with old stone-paper and the surface of the bank, like the whole of the building, may be painted flat black. There is a perfect little working model yard crane in the Trix Series.

The shed in Fig. 133 is of a type which may be as long or as short as desired. The arched roofs, finished in corrugated iron (obtainable from G. K. Slater in true scale) should be attached to one length of fretwood so as to lift off bodily, the roof itself fitting inside the facing-strip. The design for the Craigard Goods Shed (Fig. 134) is dimensioned for O-gauge, but the HO dimensions are half those for O-gauge ; OO-gauge sizes slightly larger. It will be necessary to make up small brackets of wire or of card-strip for the smaller gauges. For the designs (Figs. 135 to 138) it has not been thought necessary to include both dimensions. The loading

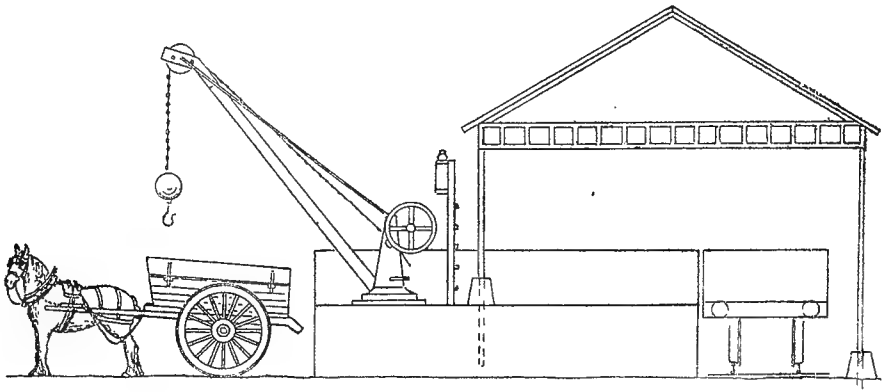


Fig. 131.

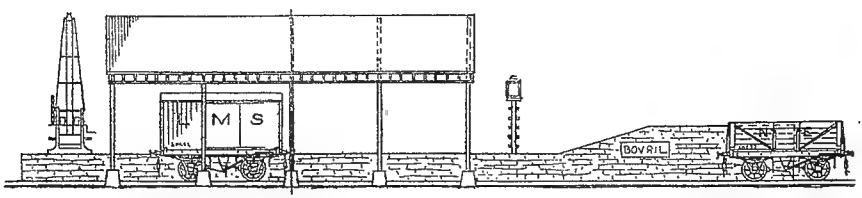


Fig. 132. (Half scale of above).

gauge fixes its own standards. The weigh-bridge and house (Fig. 137) and the wagon turntable will suit either standard. The latter is a most useful and interesting feature for the saving of space in a goods-yard layout. The smaller sketch shows one way in which it is put into service for the running of loaded wagons transversely into a shed and for the withdrawal of the wagons when empty to the " empties " road outside. The base of the turntable is a disc of tinplate, and these can often be found ready cut on hand. The rails are soldered directly to the base, which must be reasonably thick and the table then screwed loosely to the baseboard.

A goliath crane makes a striking addition to a freight depot, as the photo will indicate. Such a model is by no means the intricate thing it appears to be. The

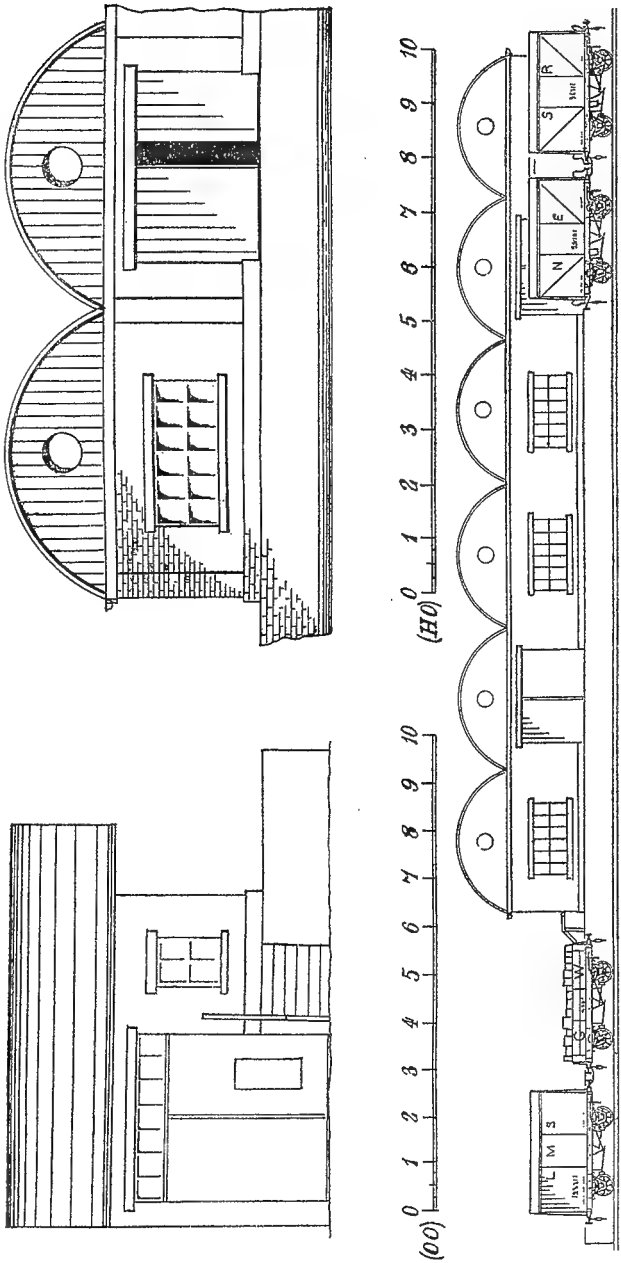


Fig. 133.

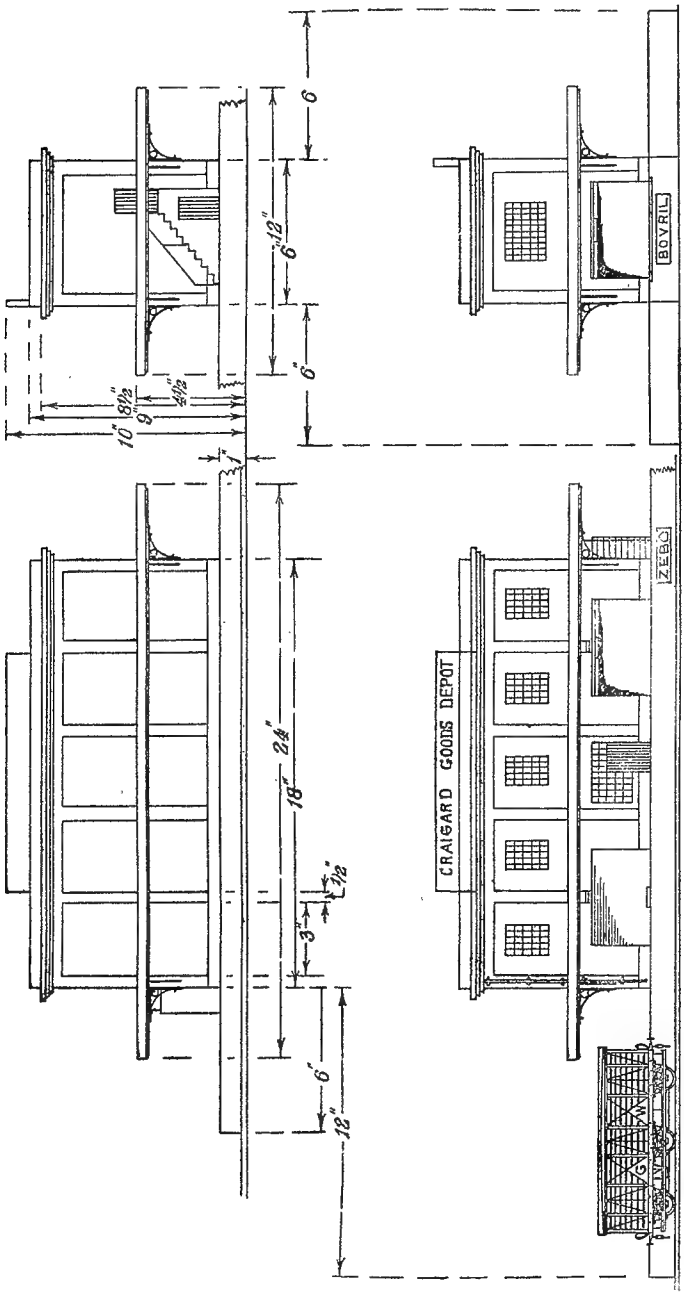


Fig. 134.—Details of Craigard goods shed. (O-gauge dimensions.)

one designed can be partially made up in a plain straight track-jig so far as the main side members are concerned. The entire framework is made of brass rail, with the exception of the uprights on the side girders and ends, which are of tinplate sleepers. The space between the main horizontals is 16.5 mm. as in the track-gauge, and the girder is made in two lengths, one length serving for a side and end, when bent over. These are then soldered together around a block of heavy stripwood to give the rectangular shape accurately. The " legs " are then carefully built up. The gallery is easily and effectively made by forming a little

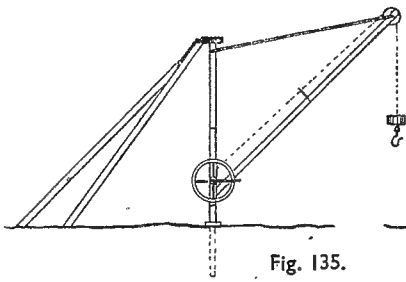


Fig. 135.

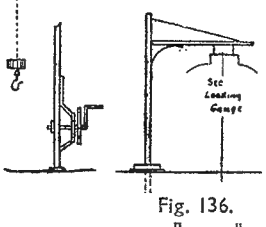


Fig. 136.

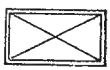
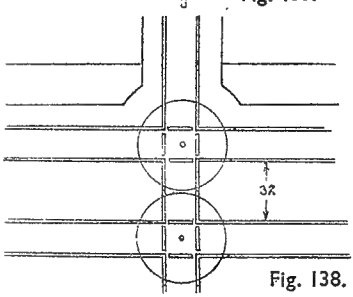
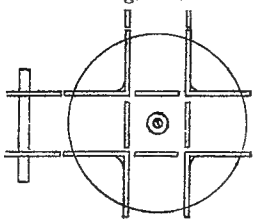


Fig. 137.





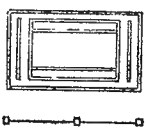


Fig. 138. (one quarter full size).

oblong framework of busbar and sweating this down to a piece of radio cabinet fine copper gauze. While soldering, press the busbar frame tightly down to the gauze with a piece of flat wood, soldering around the outside edge, which is later filed up. The wheels are set in short sections of cage-strip, ready pierced, and their axles have a short sleeve, loosely slotted over, consisting of fine-bore brass tube. The axles are soldered on the outside. The wheels themselves are disused brass wagon wheels of the solid type. A length of standard track, formed on long sleepers which have their inside sections between the rails cut out, runs along the top of the gantry. The hoist carriage is a disused coach bogie, set upside down, with the canopy (in one piece) soldered to it. A larger sketch for making the carriage is given, and this shows the structure of the lock for the brake, which consists merely of a spoked wagon wheel arranged to slide laterally and engage a pin in the wall of

the cab. One end of the hoist chain is soldered under the roof, which may have a piece of lead under it for a weight. The other end of the chain goes to the winding axle through the pulley. The small building on the gallery is made from a block of stripwood. Just above the running wheels at the base are attached square lead blocks to give weight to the crane. The running track has lengthy sleepers running underneath the wagon tracks and a guide rail should also be fitted to one side.

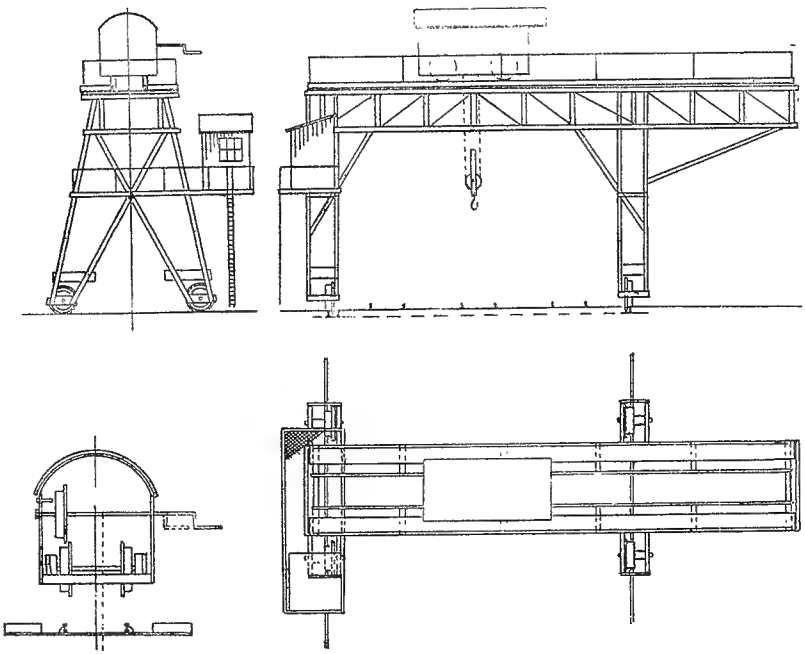


Fig. 139.—Goliath crane (one quarter full size).

Between the long sleepers and the wagon tracks there is a layer of roofing-felt. The crane is finished either dead-black or light grey. The only woodwork in the crane besides the shed on the gallery are two longitudinal strips for the footways, one on each side of the cab runway. These are fixed by forcing pins, heads uppermost, through the wood, and then soldered, the projection to the crane. To these wooden footways the handrails are attached.

A suitable type of wooden or metal fencing for a freight yard, being of unusual height, is shown in Fig. 140. Dimensions are for OO-gauge. Either in metal or wood this work is tedious, but is worth doing carefully. The goods yard lamp standard (Fig. 144) is made in the same manner as platform lamps, and may, if

desired, be fitted with a permanent ladder in place of the simple ladder-rest. The small sketch shows how to slot the shoemaker's eyelets on the thin dowelling before cutting.

Any simple hutment will serve for a coal office. More important is the provision of some kind of a retailing coal depot. A design for a coal depot is also given (Fig. 141), and is easily made from Vim cartons cut short. A photograph shows this

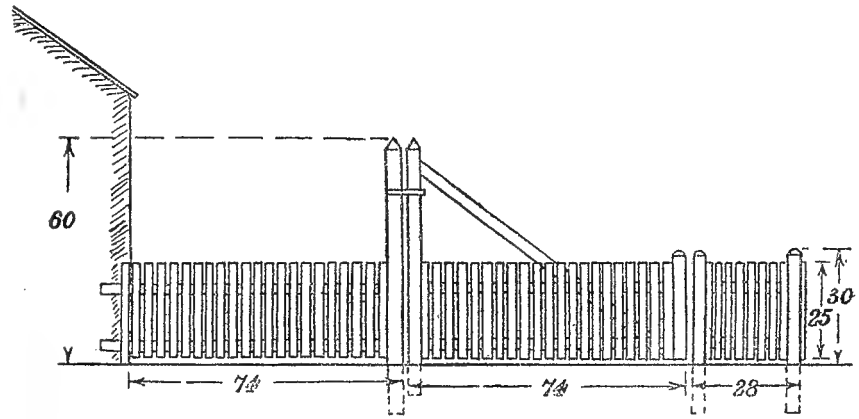


Fig. 140.—Goods yard gate.

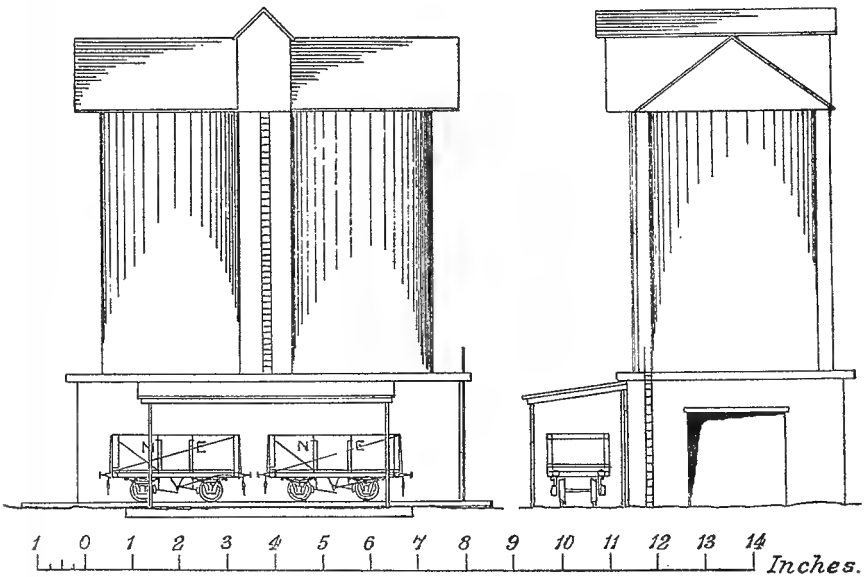


Fig. 141.—Retail coal depot.

type as modelled. It makes a very fine feature for a large depot. Most country yards have now an oil depot provided. In these are stored crude oil, paraffin, or petrol for local supply to garages, fishing fleets, etc. A Kodak film box or a piece of postal tube makes a good tank. It should be covered with rolls of paper to form

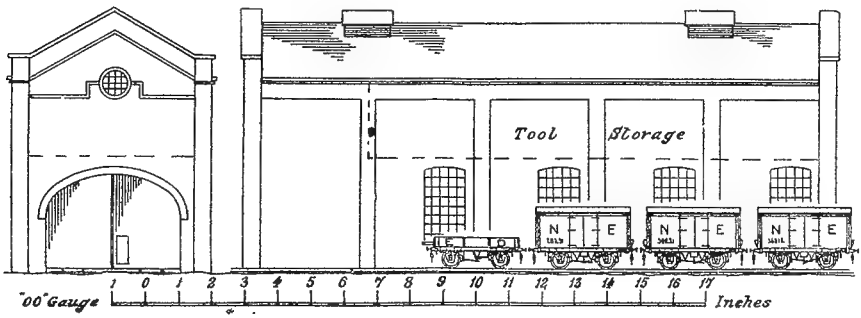


Fig. 142.—Coach shed—tool store.

cylindrical sections. The brickwork supports for the tank may be cut from the solid and shaped out with an oval rasp. The roof is corrugated iron.

Cattle-pens consist simply of a bank of $\frac{3}{4}$-in. wood with the upright posts of metal busbar soldered to pins (as for the footbridge stairway). The side rails of busbar are then soldered on the outside of the uprights by inserting pieces of $\frac{1}{8}$-in. stripwood to maintain the spacing while soldering. Fig. 143 gives a suggestion.

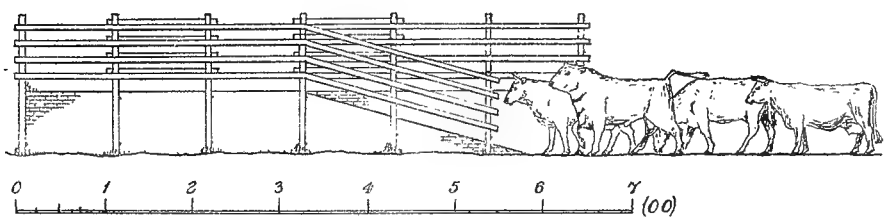
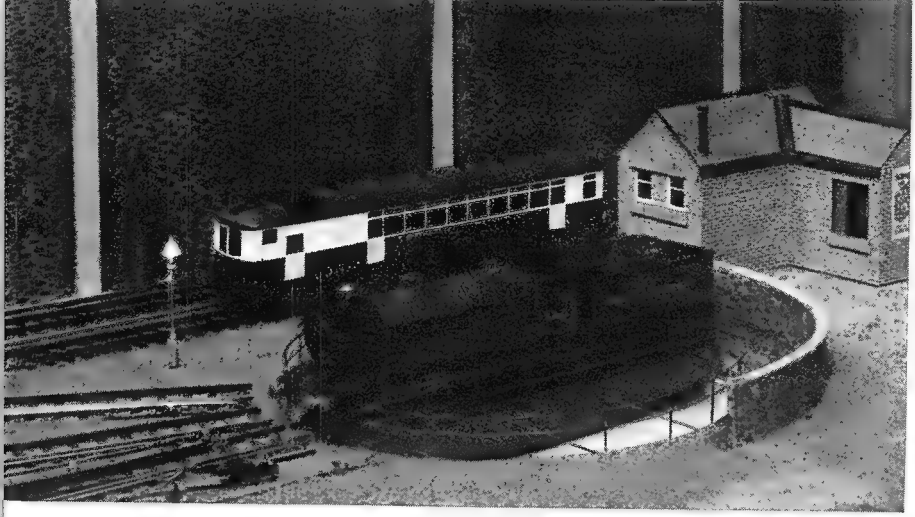
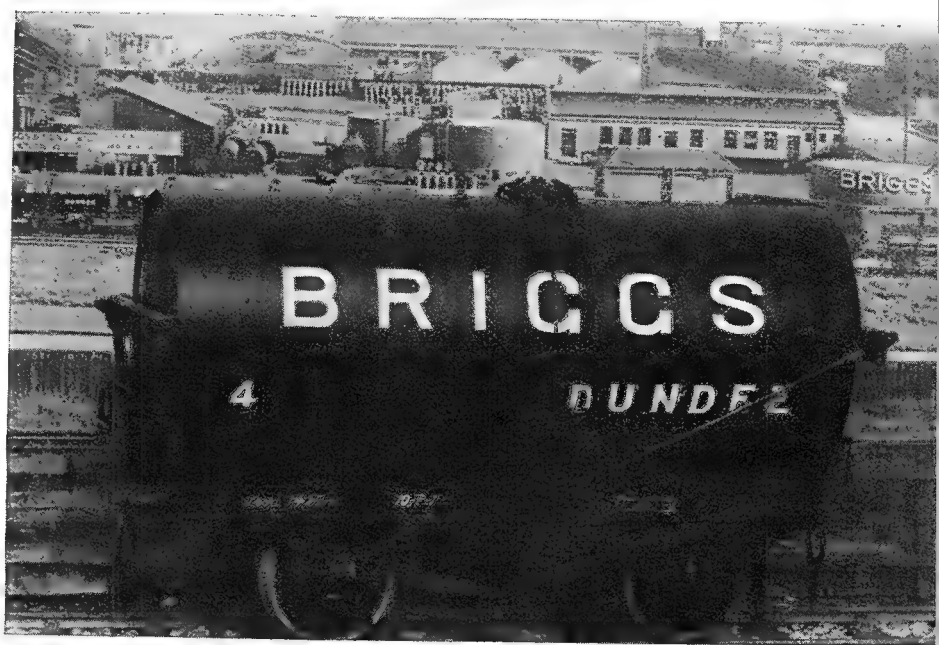


Fig. 143.—Cattle pen.

The base walls may be covered with brick-paper, and on completion, the posts and rails are copiously painted with flat-drying white to represent whitewash. The surface of the base is glued, and sprinkled with granite dust. Tufts of green sawdust (as obtainable from an advertiser for scenic purposes) are judiciously added at the corners and along the lower edges of the base. The gates for access to the wagons are formed by means of rails—short lengths of busbar soldered along the top of the side rails across the entrances.

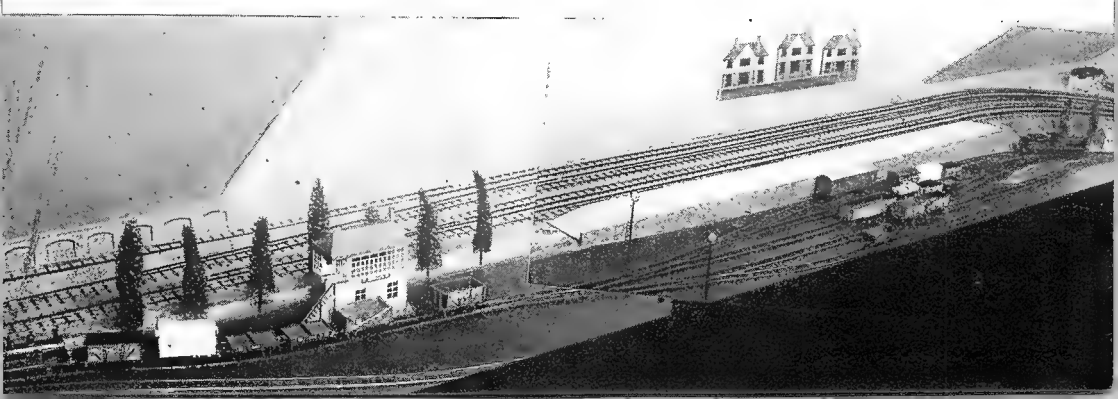


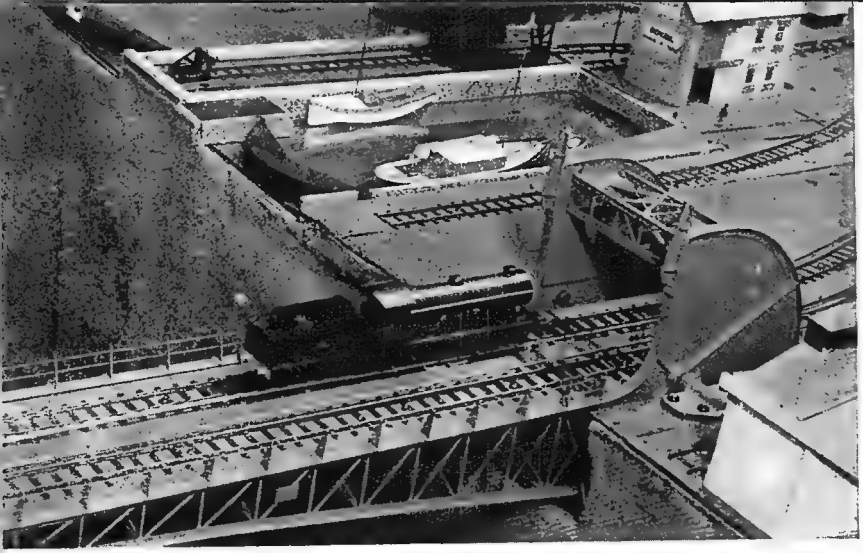
The first West Midland turntable with Exley locomotive and the first Sentinel-Cammell coach ever modelled.



A fine O-gauge tank wagon on the Craigard Railway owned by Mr. C. W. Meredith and built by the late Mr. J. G. Shaw.

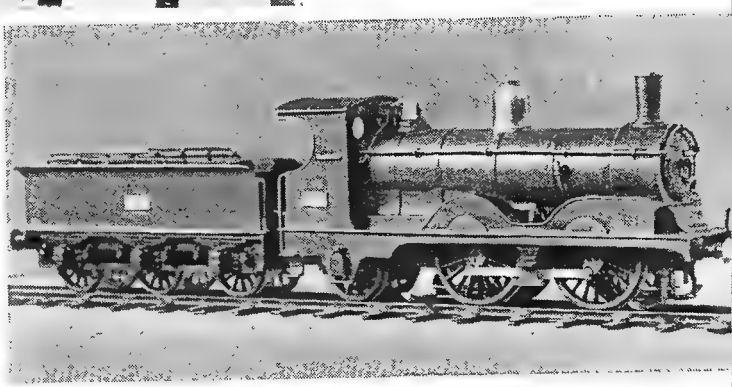
Below : A view of the hump and marshalling yards, W.M.R.





Mr. Ian Frazer's OO-gauge lifting bridge on the West Midland Railway (1936) (closed position).

The LaNaL auto-uncoupler.



Mr. J. H. Ahern's L.S.W.R. "Jubilee" class engine (OO-gauge).

Methven Station, W. M. R., 1942, with some hand-made wagons.

A somewhat novel idea is embodied in Fig. 142. This is a design for a coach shed in which spare carriages may be stowed away out of the sun and dust—two mortal enemies of the layout—the building serving at the same time as a small tool-box, in which may be kept an oil-can, a piece of waste, pliers, and so forth, so constantly in requisition on the line. The tools are kept in the upper part of the building, and care should be taken to leave a sufficient space for the opening and shutting of the doors from inside. The roof, of course, lifts off. The shed is finished concrete.

In discussing a goods yard, something must be said about miniature loads. Two factors have to be borne in mind in the simulation of freight for goods wagons. First, the articles must be reasonably light; secondly, they must be realistic and accurately made to scale. A number of sketches are included to give some idea of how to proceed with this work. These are as follows: Fig. 145, a large casting for a well wagon consisting of an iron pipe fitting. It is painted red oxide and fixed down with ship's chain; Fig. 146, a galvanised iron tank made from a piece of dowelling or a *passe partout* reel centre, covered with galvanised iron paper, with a black disc at one end for a manhole; Fig. 147, a barrel made from a wooden bead from a department store, the bead forced on to a match-stick, the ends cut off, and the lines drawn in indian ink; Fig. 148, a case of machinery made from a piece of strip-wood, battens of very thin wood (Aberdeen matches from Salmon & Gluckstein), and planks lined on; Fig. 149, a roll of lino made from $\frac{1}{8}$-in. dowelling wrapped in parcel-strip; Fig. 150, a case of glass; Fig. 151, a bale of jute; Fig. 152, a drum of cable made from the two metal ends of a small Kodak spool fixed on a short piece of the core, paper sides lettered in ink, yellow and white paper being used, the wood slats on the circumference consisting of a strip of $\frac{1}{32}$-in. plywood rolled round, wired on, and lined. Milk churns (Fig. 153) can be made of Halma "men," wire handles being fitted, and the whole painted aluminium; Fig. 154, a cart-wheel from a Dinky Toys tractor; Fig. 155, an iron field gate made up in wire and painted white; Fig. 156, a ship's boat; Fig. 157, bundles of iron pipe made up from wire cut to identical lengths and wrapped with thread; Fig. 158, a box of oranges—two square wood ends, thin strips for sides, the whole filled with yellow beads or bullets painted red; Fig. 159, Stanton pipes made from cardboard. Fig. 160, sacks of flour from putty, with pegs stuck in when hard, the whole painted white and lettered in blue.

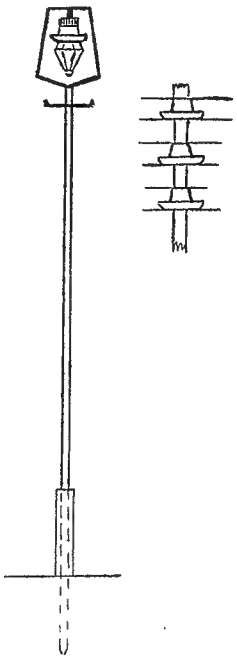


Fig. 144.

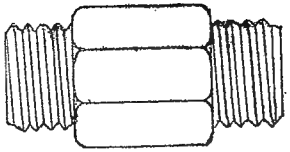


Fig. 145.

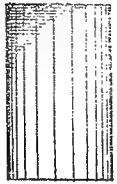


Fig. 147.

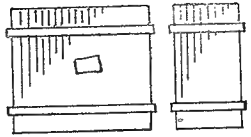


Fig. 148.

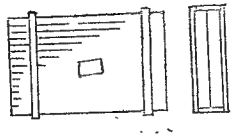


Fig. 150.

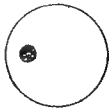


Fig. 146.

Fig. 149.

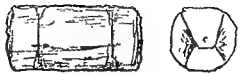


Fig. 151.

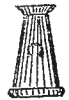


Fig. 153.

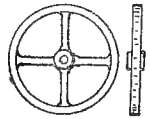


Fig. 154.

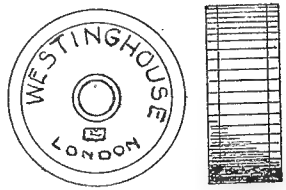


Fig. 152.

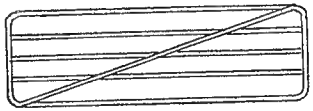


Fig. 155.

Fig. 157.

Fig. 156.

Fig. 158.

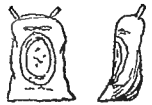


Fig. 160.

Fig. 159.

Full size drawings for HO and OO.

The subject of timber loads itself is interesting. Tree-trunks are represented by suitable twigs from the garden, sawn up neatly and trimmed with a pocket-knife ; sawn timber comes from stripwood, cut up and bound in sections ; floorboards from Aberdeen matches similarly treated. True to their name, Aberdeen matches are given away free by one advertiser on request. An attractive and picturesque load is the tarpaulined one, made up by filling a wagon with tissue paper and

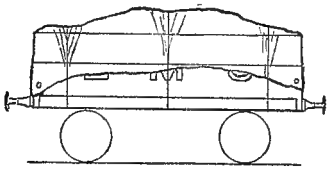


Fig. 161.

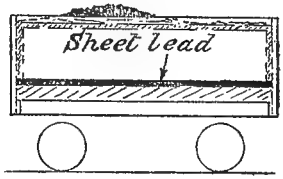


Fig. 162.

covering it with cellophane from a cigarette carton after this has been painted flat black on one side. Turn the painted side outwards, and bind down the cover tightly with brown thread—if necessary, sprigging the ends (Fig. 161). A sheeted timber wagon is most striking, and is arranged much the same (Fig. 163). When there are plenty of duplicate wagons, several of these timber loads may be kept permanently made up and simply substituted by empty replicas when reaching the journey's end. It is often useful to have a piece of lead in a very light open wagon, and this should exactly fit the inside ; it will give a little needed weight

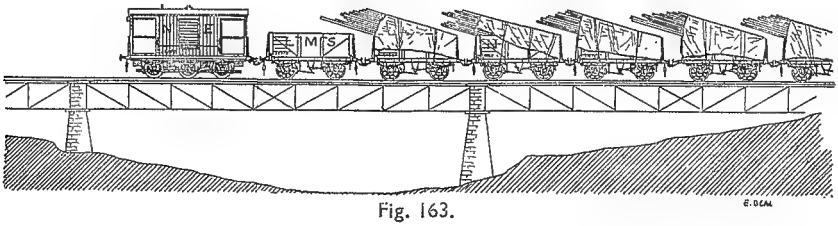


Fig. 163.

to an unduly light vehicle. Loads of coal and gravel in bulk are stuck on a false base with glue (Fig. 162), which slips loosely into the wagon ; there is then no trouble in case of a derailment.

Larger objects make good cargoes. Thus we have (Fig. 164) a farm wagon made from oddments and loaded on an "imp" ; Fig. 169, a caterpillar steam shovel on a well wagon. This was made from the undergear of a small toy tractor, bought for 6d. A larger type is depicted in the silhouette (Fig. 165). Fig. 166 gives the method of loading trees on bolsters, with a match-truck at one end. Fig. 167 shows a horse lorry on an L.M.S. carriage truck. The traction engine

(Fig. 168) is readily constructed from the wheels of a well-known toy tractor and a piece of dowelling, a dummy cylinder and flywheel (from a watch), and looks well on an imp wagon. Other items are eathenware sinks from the empty Reeve's water-paint containers generally thrown away. These are the exact shape, and should be packed in sets with a wisp of straw between. "Window-lite"—a patent glazing agent consisting of celluloid-covered fine mesh galvanised wire net —has merely to be made into small coils and tied up to represent rolls of wire

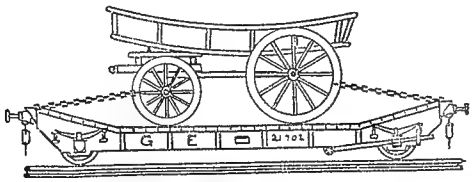


Fig. 164.

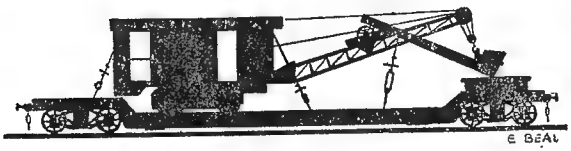


Fig. 165.

netting. A large number of such useful loads can be bought commercially quite cheaply. A very good selection is sold by A. W. Hambling & Co., Mellor and Kenyon, to accurate scale for either gauge; these include milk churns, and so forth.

The subject of container traffic is too vast to embark upon. I give one full-size design for a G.W.R. meat container (Fig. 170), which should be simple to copy, being finished white with black lettering.

Coming now to the subject of locomotive depots, we begin with a couple of designs for engine running sheds. One or two photos will also be found of service in displaying engine sheds. Such a shed must, of course, be so made as to lift bodily from the track, to allow engines to be handled if necessary. The design in Fig. 171 seems to require little comment, most of the details of construction having been already touched upon. This shed should easily house six engines. The front elevation is very striking, and is given in Fig. 174. The other design (Figs. 172 and 173) is a much simpler style, and is more modern. A water tank is shown in Fig. 175—one of unique type. The trestle here was made of $\frac{1}{8}$-in. brass-strip soldered up. The tank portion is a length of wooden van-body. Other details are of soldered wire and rail, the footway along the top being made like that of the goliath crane by soldering gauze to a rectangular piece of busbar. Pipes are of cage-wire, unpainted, a larger section of wire being utilised for the supply tee.

This is ended with sections of flattened insulating tube. The draining receptacles are formed by soldering a piece of rail either around a square of gauze or over a row of pins, afterwards trimming with a file. The tank is painted flat buff and afterwards lined out with strips of black parcel-paper. It rests on cross-members of rail, these being fastened to the base and soldered to the trestle. The gallery is black, like the ladder, and the trestle itself is red. A water standpipe (Fig. 176) is also shown, for use where the tank is located some distance away. The dummy control gear, operated from the locomotive tender, is made of blanket pins, which are 2 in. long. The heads are made to simulate bevel gearing.

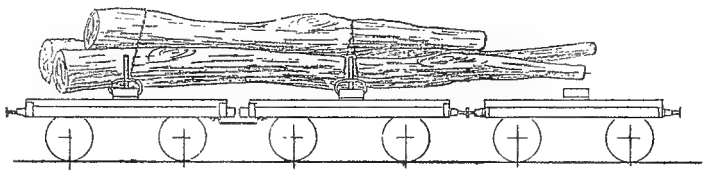
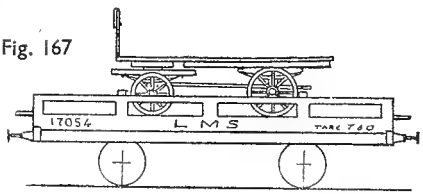


Fig. 166.

Fig. 167



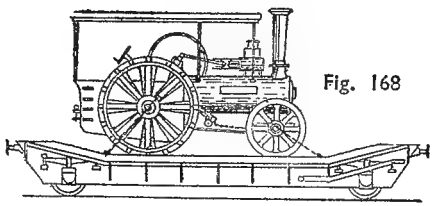


Fig. 168

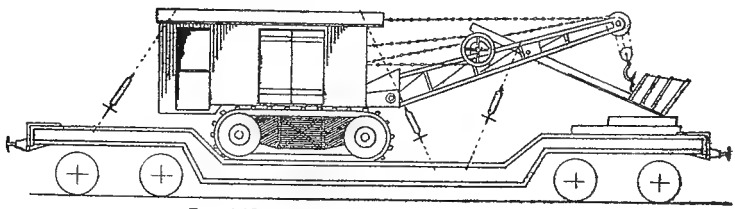


Fig. 169. (Sketches half size OO-gauge.)

We pass now to some features rarely modelled for this department. Locomotive shears are shown in Fig. 177, $\frac{1}{8}$-in. brass-strip being the material. The kindling furnace (Fig. 178) is made of solid blocks of wood covered with brick-paper. The ashpits (Fig. 179) are built around a slot cut in the baseboard between the rails. Several expedients for constructing engine-shed smoke-jacks are revealed in Fig. 180. The first is a golf tee, with a pulley, which was taken from a Woolworth curtain fitting, fixed to the top. The same pulley is used in the second example, this time suited to a flat roof and having a brass chimney-pot for its base. The third type is O-gauge ladder, built around dowelling with a discarded wheel stuck in for a top. The other example is built up from stripwood and card.

Types of coaling stages are so numerous to-day that only one or two can be mentioned here. The open-fronted shed as built for the Craigard Railway (a copy of one located on a Southern Railway depot) is popular (Fig. 181). The only detail calling for mention seems to be the supporting brackets under the awning, which are wire-built. The loading barrow has HO wheels, and is built to narrow gauge.

A word may also be said about step-ladders of the type here shown. These are not easily modelled in any gauge, and for our adopted standards they are very difficult. They can, however, be done admirably in metal if patience is exercised. The work begins by cutting diagonal grooves at equal distances of $\frac{1}{8}$ in. and all symmetrical, in a strip of $\frac{1}{8}$-in. by $\frac{1}{16}$-in. brass, about half-way through. The steps are then cut from OO-gauge sleeper and all filed up to the exact length. These are

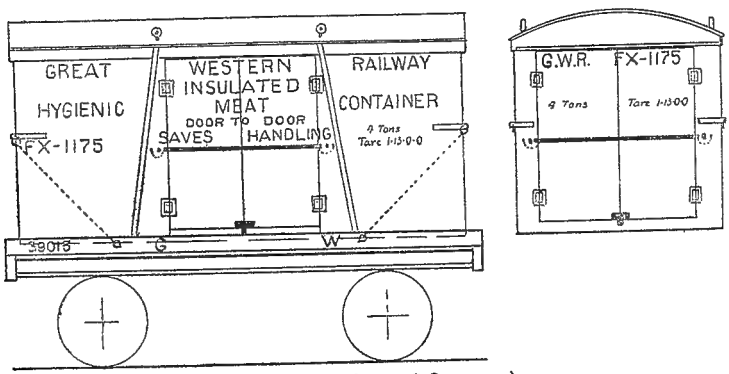


Fig. 170. (Full size OO-gauge.)

soldered into one side of the stairway by means of a piece of $\frac{1}{8}$-in. by $\frac{1}{2}$-in. stripwood held between each step. On completion, the side is laid flat and the steps trued-up with the iron. The fitting of the other side is much easier. Handrails are soldered on in the usual way, but care must be taken not to melt out the steps. A file can be generously used to trim off the solder afterwards. It will probably be found that the beautifully made stairways sold by the inch by G. N. Slater will be more satisfactory, though a little higher in cost.

A coaling stage of the American type is to be seen in the photo. This was built up from cardboard and stripwood, and is a very nice model. In one photo is a coaling stage on the W.M.R.

For a standard OO-gauge turntable I recommend an idea of my own, set out in Fig. 182. This is, in my opinion, the most expeditious and reliable method of making a hand-operated table, and mechanical tables are not only much more complicated, but are not according to real practice unless electricity is used. For

the design given there is no need of a well in the baseboard, and the approach tracks are only very slightly raised above the normal level. The foundation is a tinplate disc of about 10 in. diameter, having a circular hole in the centre and four small screw-holes near the circumference. A circular piece of the felt formation of the railway is cut out around the disc itself, and the disc, after being painted two coats of concrete colour, is sunk into this aperture. A length of rail is soldered

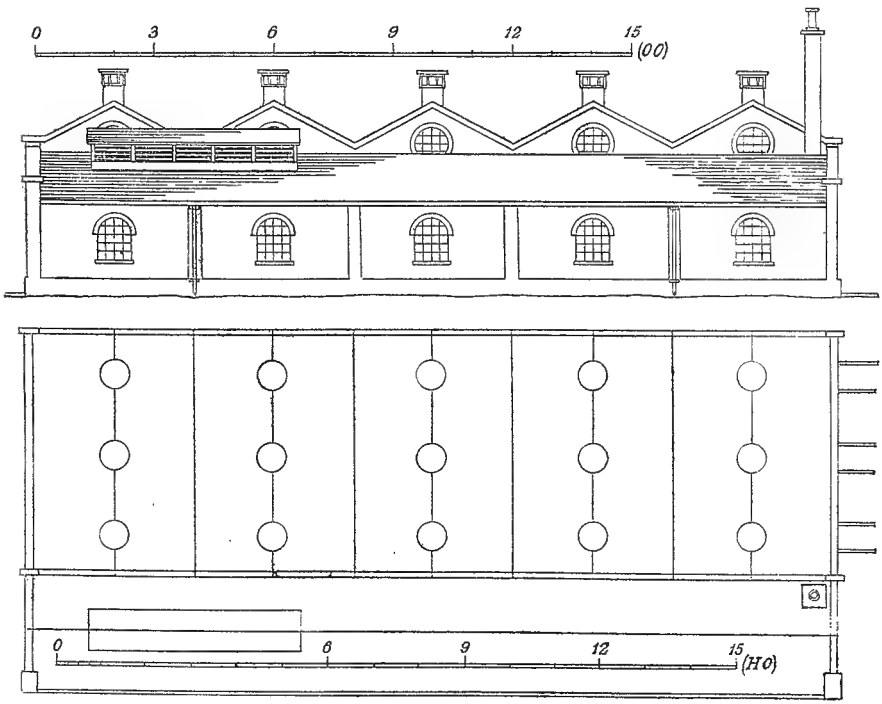


Fig. 171.—Locomotive shed.

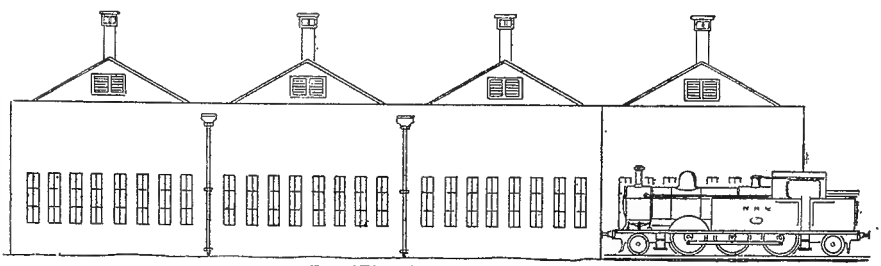


Fig. 172.—Locomotive shed.

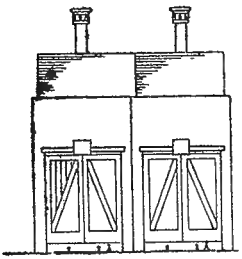


Fig. 173.

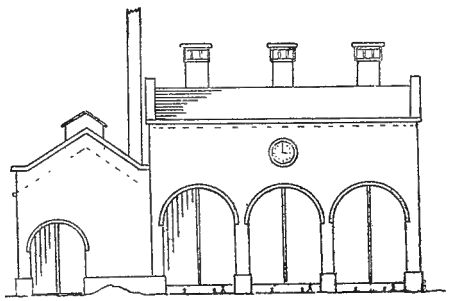


Fig. 174.

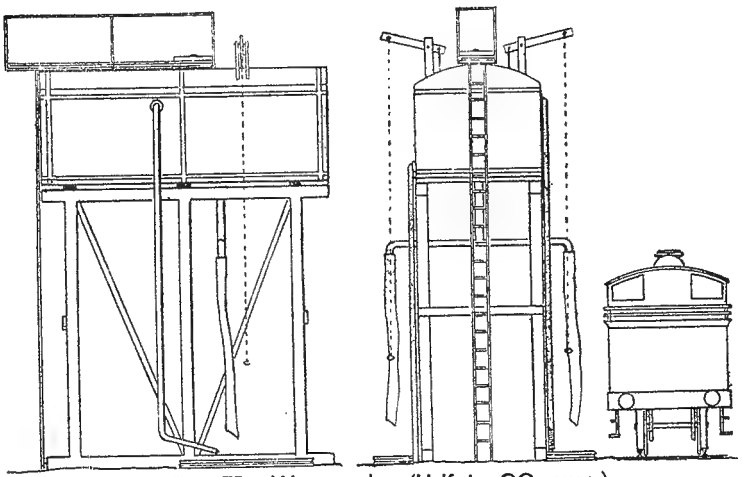


Fig. 175.—Water tank. (Half size OO-gauge.)

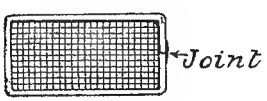
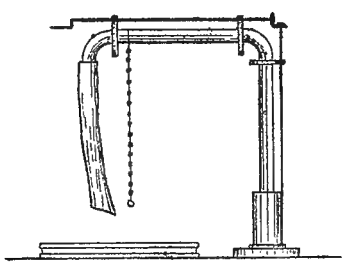
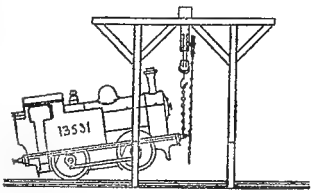


Fig. 176.



on the surface to form a circular runner. This must be perfectly level and flat down to the disc. It is joined with a fishplate, which is soldered in place, and has its underside afterwards filed off flush. The running deck consists of a piece of similar tinplate, with a similar central hole ½-in. in diameter. These two holes (in the disc and deck) must fit snugly over a piece of ½-in. dowelling, a short length of which is now cut and drilled exactly in the centre to take a 1½-in. iron nail. Next build up the turntable girder sides of rail as shown, soldering the rail tightly over a web of cardboard or



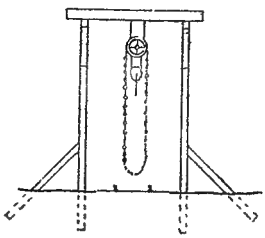


Fig. 177.

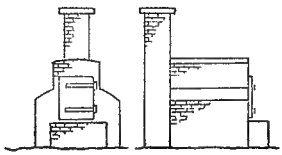


Fig. 178.

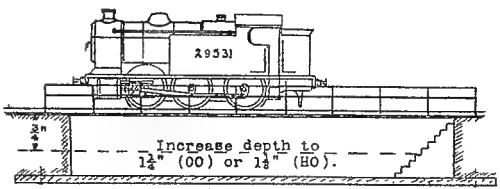
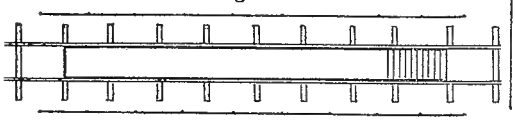


Fig. 179



Quarter full size sketches.

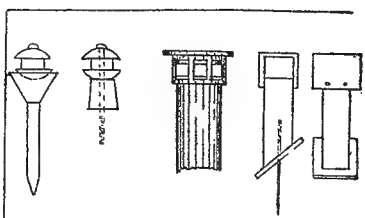


Fig. 180.

Half size sketches.

very thin plywood, and setting in cross-members for uprights to retain the rail. A portion of the rail should overlap from the top to the underside, which engages the surface of the circular running rail. The two completed sides are then soldered to the tinplate deck as in the small sketch, the lower side member of rail coming up underneath the deck. This is best done by use of a length of 1-in. stripwood for a soldering block, to get the whole rectangular. Fit both sides in the same manner. The pivot nail should now be pushed up from under the baseboard through a drilled hole exactly in centre of the ½-in. aperture of the disc. Then the dowelling block is slotted over the nail and should slip into the hole. Then the deck goes over the pivot and the hole of the deck comes over the dowelling. A thin wood cap is

now made of plywood to fit between the track-rails, which are soldered directly to the deck. There is a hole in the centre of this cap which takes the pivot. The cap should, when pressed right down, just allow the table to turn sweetly, the end contacts engaging the runner on the disc. A brass washer is soldered over this cap, then the nail, and the job is done. You now have the turntable, with a course for electric current from the disc to the running rails. Fit a piece of watch-spring (heating one end red-hot to take out the hardness before drilling the two holes) to engage the nailhead under the baseboard. All you now require is the conductor rail for engines, which is the most difficult part. It must be fixed to the deck but not soldered to it. Some low-section material should be used for the rail, to allow for the wooden under bearer (see the right-hand small sketch). To this bearer

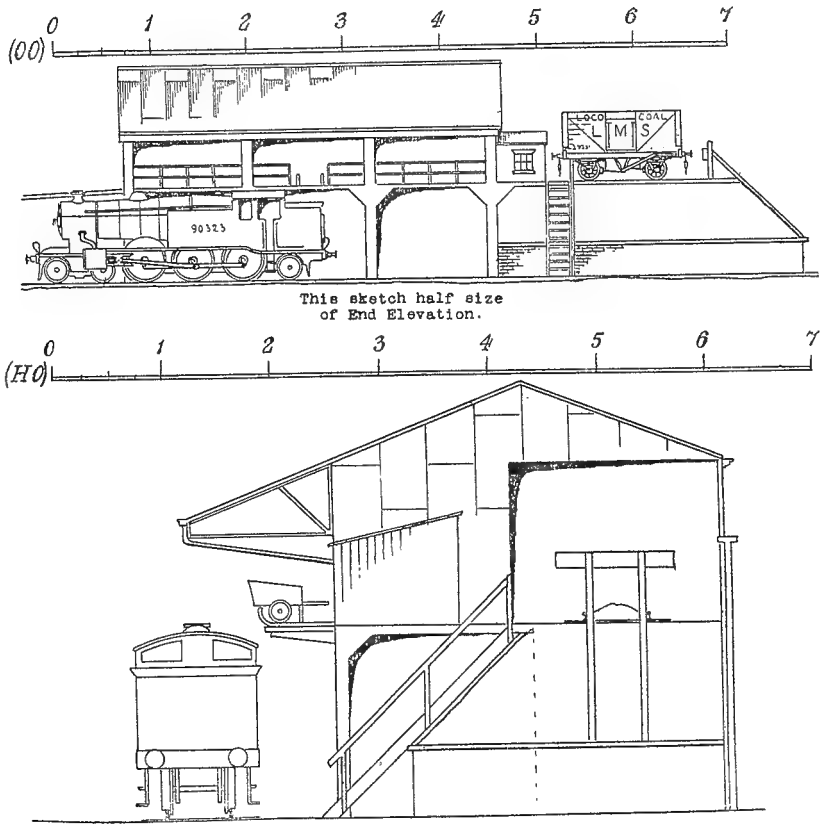


Fig. 181.—Coaling stage.

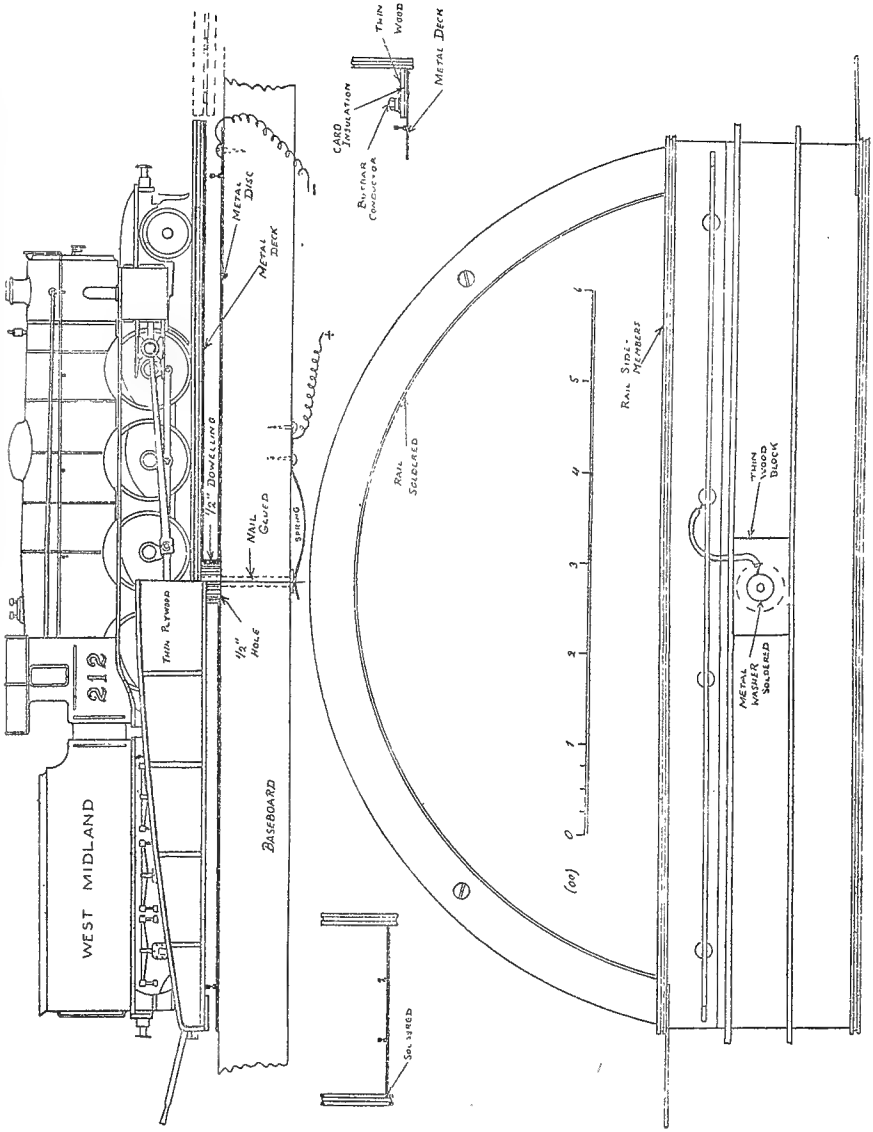

WEST MIDLAND
212
BASEBOARD
THIN PLYWOOD
1/2" DOWELLING
METAL DISC
METAL DECK
NAIL GLUED
1/2" HOLE
SPRING
SOLDERED
CARD INSULATION
BUSBAR CONDUCTOR
THIN WOOD
METAL DECK
RAIL SOLDERED
RAIL SPLIT RINGLESS
THIN WOOD BLOCK
METAL WASHER SOLDERED
(00)
0
1
2
3
4
5
6

Fig. 182.

the conductor may be screwed in holders as usual ; the screws are filed off underneath and the underside covered with thin card for insulation. The whole may then be stuck on the deck. If the wooden under bearer of the rail is made a tight fit against the running rail and the turntable side, it will not require much adhesion and Certofix will do it. The conductor-rail wire goes to the pivot.

The turntable sides look well when painted flat buff. A pair of operating levers may be soldered on. There were several of these tables in regular service on the West Midland Railway, which were eminently satisfactory. A little oil eases the running. Four set-screws may be inserted around the disc, and much useful adjustment can thus be secured. The approach tracks are slightly packed underneath the felt below them to bring them to the table level.

It will be found that this method of operating a turntable, while acceptable, for a machine adapted for manual operation, will not be freely-running enough for

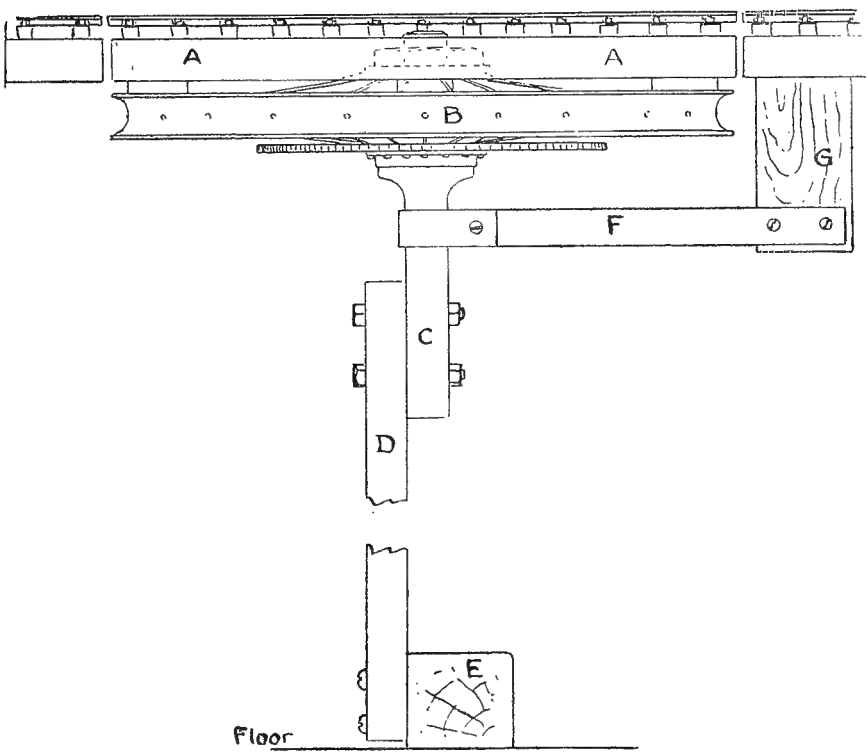


Fig. 183.—Brig. Sir Eric Hutchison's scheme for a turntable mechanism.

any form of mechanical manipulation. An ingenious scheme, and one which involves very little financial outlay, was suggested to me some time ago by my friend Sir Eric Hutchison, Bart., that will provide a movement that should lend itself readily to operation by hand crank or electric mechanism. The scheme also overcomes the difficulty of arranging a turntable to rest evenly on the track formation surface. Briefly, the idea is to use a discarded pram or small bicycle wheel, preferably one with ball-bearings, though this is not essential provided that the wheel is a good fit on its axle and is not sufficiently worn to be capable of rocking from side to side.

The first procedure is to cut out accurately from the baseboard an aperture the size of the turntable; if the baseboard is of solid wood this piece will itself serve for the deck. The diameter should be something like that of the wheel, though whether it is larger or smaller is really not serious. The table is next mounted on chocks on the wheel (B) (Fig. 183), and securely attached with bolts and plates. It may be necessary slightly to shorten the axle or to make some adjustment, depending on the length of the hub in order to keep it below the turntable level. The axle (C) is bolted to an extension-piece (D), which may be of either hardwood or metal. The lower end of this is screwed to a block (E), which is attached to the floor. The greatest care must be taken to get the axle vertical, so that the table will revolve on an absolutely level keel. The upper end of the axle is gripped by a stay (F), attached to a block (G), which is screwed into the baseboard.

The securing of accurate alignment in turning is the only real difficulty in this simple and effective contrivance. The table can be operated in several ways. If desired, a second-hand gramophone motor can be called into service, and this will have gearing that can easily be reduced to give a slow movement. Meccano gearing is also admirable for this purpose. A still simpler method is to install a belt around the rim of the wheel, operating about a smaller pulley of the curtain-rail type, with the aid of a length of catapult elastic, which may one day be again on the market. The pulley may be provided with a vertical shaft and crank handle to project above the baseboard at any given point for convenient hand-operation, or propulsion by means of a cheap motor.

The remaining items for this chapter are those of trackside equipment and industrial adjuncts.

Signal cabins may come first, and it is well to have several designs for these ubiquitous features. Examples of these are shown in the various photographs. Three or four fresh designs are also given, as there is need of variety in signal cabins even on a confined layout. A concrete cabin (Fig. 185) of the overtrack type will be found highly ornamental and the one depicted is based on a cabin in the Argentine. The stairway is concealed, and there is a small workshop adjoining the building on the track level. A very novel and striking wall model, for building out

of a high retaining wall (Fig. 184), is simplicity itself to construct. Fig. 186 gives a design that can be adapted with equal convenience for either parallel or cross-track positions. The cabin, to the desired length, is built up on a wood floor, and this is finally installed upon metal bearers, which can be soldered up from Manufax girder-strip in metal, the web being easily filed out for the horizontals. The framework is attached in place on the layout by soldering nails in the base of the upright girders. In Fig. 187 we have a drawing and sketch for a very neat type of small

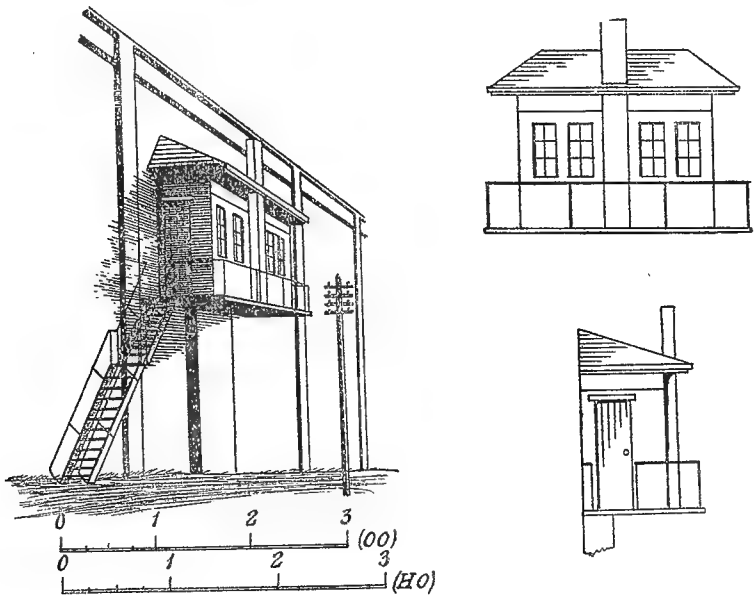


Fig. 184.—Wall cabin.

cabin in red brick. The stairways are best made from card-strip or stripwood, cut in a mitre box, each piece separately. The brick-paper covers the entire front in one piece, including the front of the stairway. Handrails are of soldered wire. The stairway for the cabin (Fig. 184) may, if desired, be made as for the coal stage or, on the other hand, double-rung ships' ladder may serve.

It is unlikely that a model mail apparatus will be required to do actual service in such a small scale, but a complete set of sketches (Fig. 188) is included for a dummy of this apparatus. The ground apparatus itself is soldered up in metal. The van apparatus will normally be a fixture in the side of the van. It requires little ingenuity to make it operative. A sliding door in the opposite side could give access to the bags. A number of ideas for a working model of this type have been given in the various periodicals.

Some countryside features for the permanent way call next for treatment. The old-fashioned form of water tower, built in brick, with a square masonry chimney connected with the furnace used in winter, is still quite commonly seen. The sketch (Fig. 189) will make clear the type of structure. A realistic fogman's hut may be made from a stone wall pillar as sold in Britains' Farm series. The pillar is shortened with a sharp knife (Fig. 191), and has a suitable portal cut in one side. A seat may also be fitted as in actual practice. The brazier to stand by the hut is made from pins in their papers exactly as indicated ; care should be observed that there are the same number of pins as in the sketch, and that they are in the same order of arrangement. A small brass washer forms the base of the

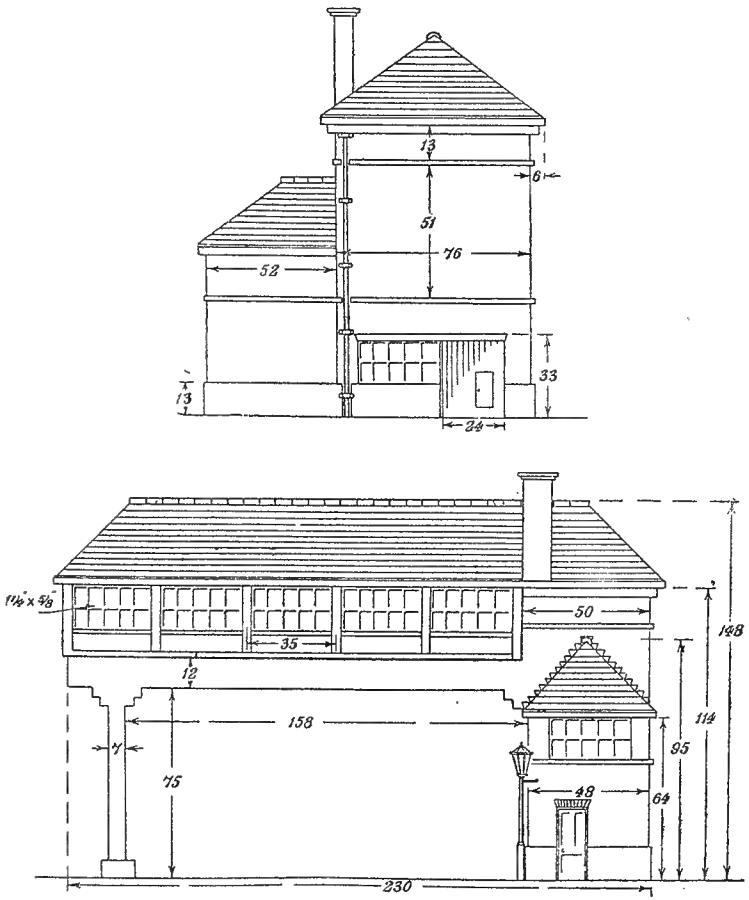


Fig. 185.—Overtrack signal cabin. (Dimensions for OO-gauge.)

brazier. Fig. 190 shows what may be done on a retaining wall by a judicious shading in indian ink of the common brick-paper. The concrete mountings may be done in painted paper-strip.

The function of the now commonly occurring water-softening plant on the railway is that of rectifying the chemical composition of the water used in locomotive boilers so that the amount of " scale " or " fur " deposit on the walls of the boilers is eliminated or vastly reduced. Districts where spring water is taken from a chalky earth are especially involved. Such plants are to be seen not only at locomotive depots but very often at locations where there are water-troughs for the filling of tenders at speed. A realistic and effective part of a layout equipment, therefore, may take the form of one or other of these plants.

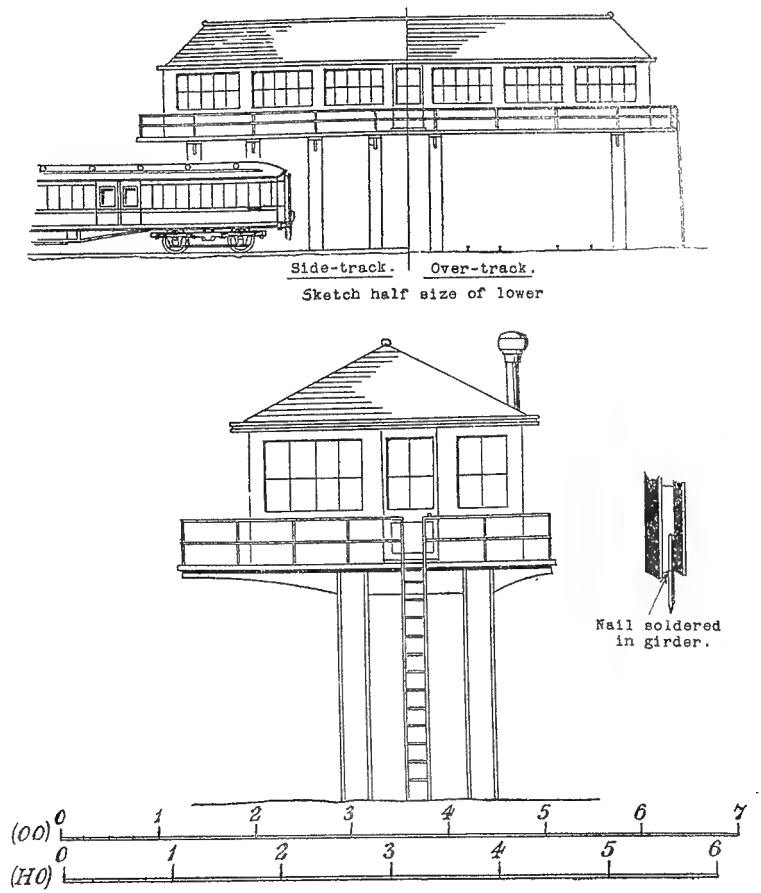
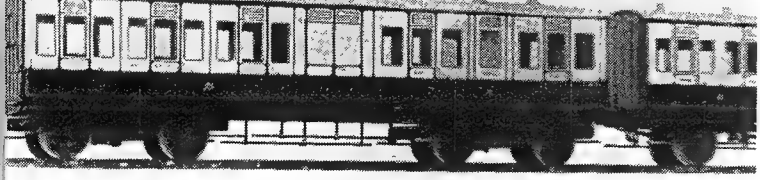
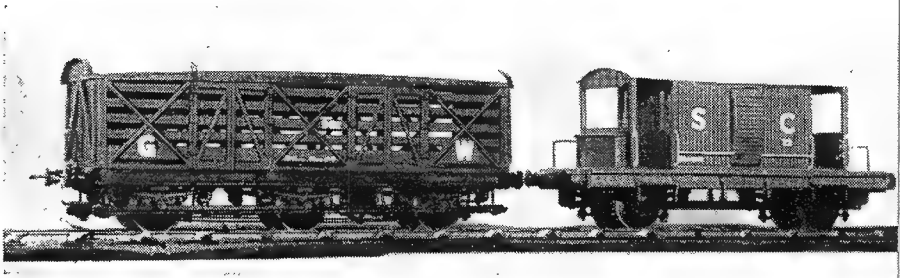


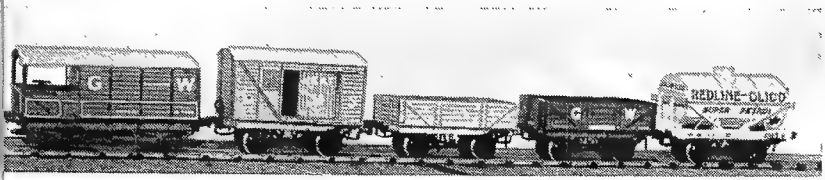
Fig. 186.—Alternative cabin.



4-mm. scale model L. N. W. R. main-line bogie coach of the 1885-1895 era, by "Precedent."

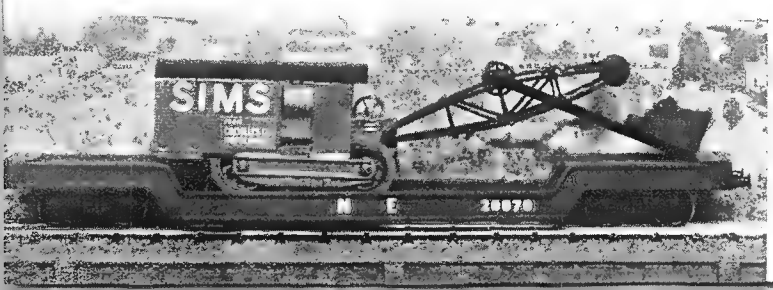


Super-detail hand-made wagons (OO-gauge).

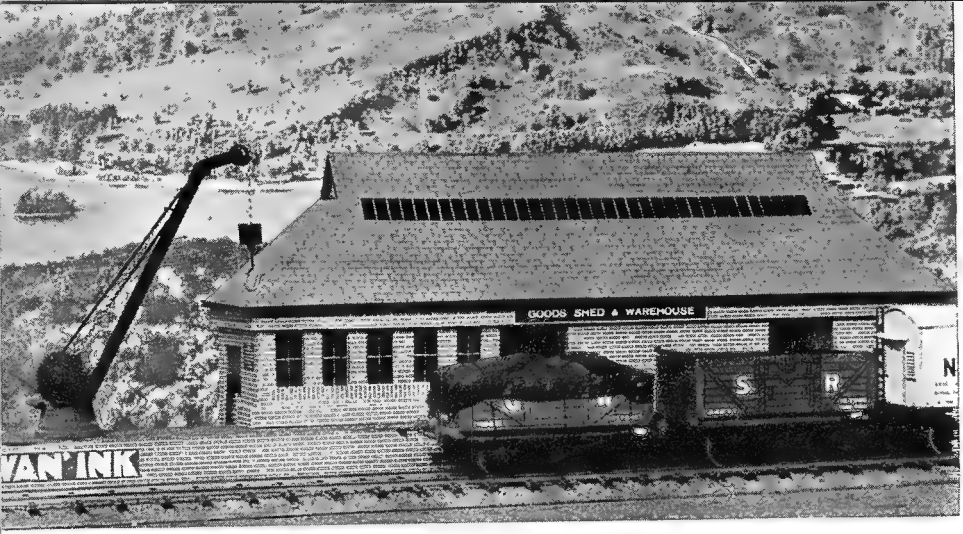


Model OO-gauge goods wagons (super-detailed), Merco lithographed papers.

OO-gauge super-detailed Merco wagons with hand-made bolsters and implements.

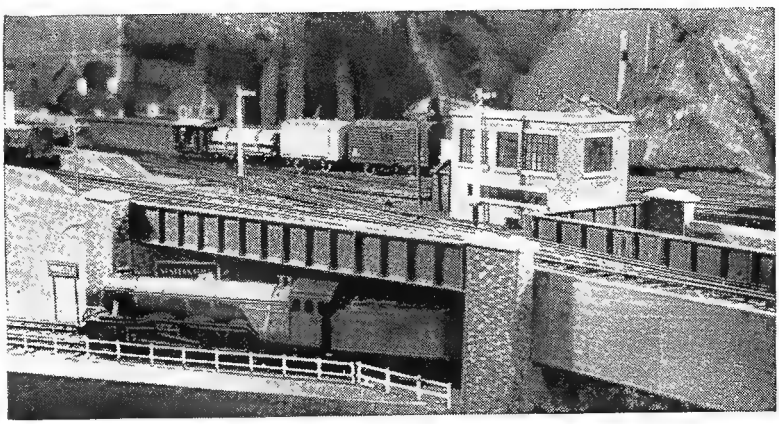


OO-gauge steam-shovel load on well wagon, by the author.



A small and compact modern type of goods shed in OO-gauge.

Wagon repairs depot, Laurenceton (West Midland Railway).



The point where the low-level inclined tracks pass under the throat of Laurenceton station yard.

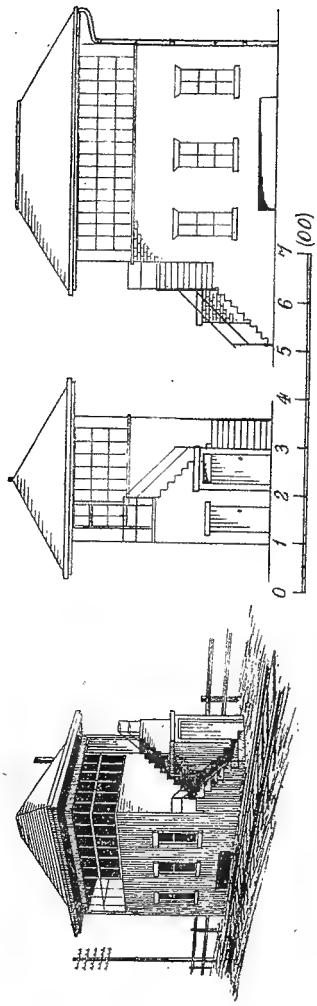


Fig. 187.—Small cabin.

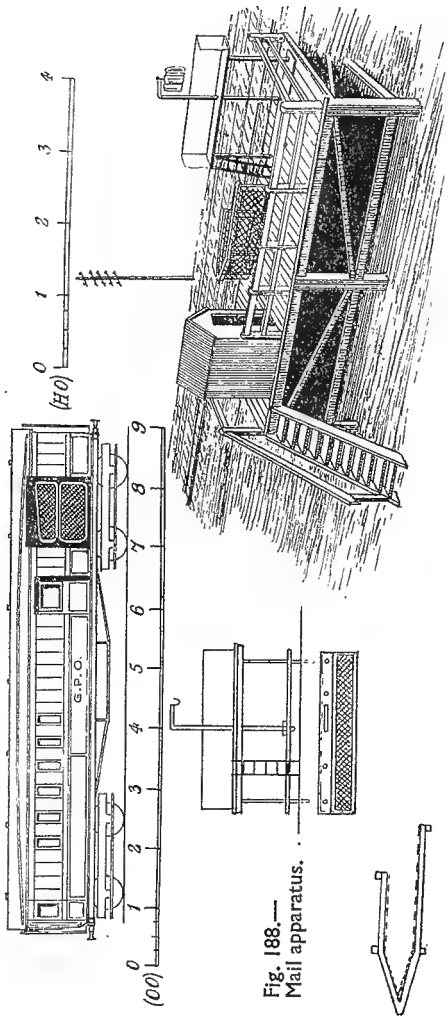


Fig. 188.—Mail apparatus.

We have chosen for our design (Figs. 192 and 193) one of the older examples on the Great Western Railway, mainly on the plea that it happens to be as interesting and picturesque as such a feature can be. The sketch shows the general layout, and the small plan will afford more precise guidance as to the various proportionate dimensions. The design is interesting in that a couple of pensioned locomotive boilers are installed for the purpose of generating steam for pumping and operation of the appliances. Their projecting smokeboxes are fitted with somewhat quaint chimney extensions, all these details affording welcome scope for the modeller. The equipment includes a boiler- and pump-house, a storage tank and the usual mixing tanks. An approach siding from the main line serves for coal and tank

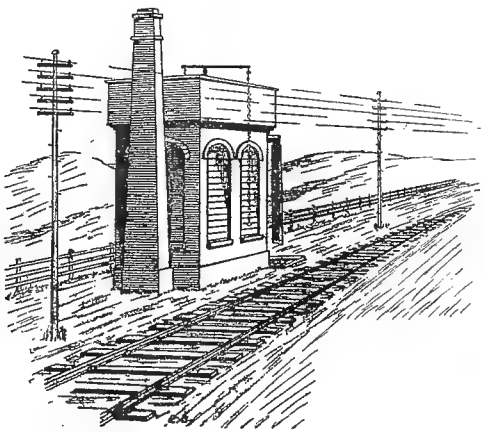


Fig. 189.—Country water tank.

wagons—the latter for removing the sludge or deposit periodically from the plant. The storage tank is of the usual G.W.R. design and is situated above the pump-house. It has a covered-in roof, and a gangway extends from the top of it, across the sidings, to the mixing tanks. These are of the upright cylindrical type and are three in number as shown.

The various characteristic items are reproduced in dummy form. A sketch gives careful details of the projecting smokeboxes of the boilers, which may consist of a couple of Reidpath castings. The chimney extensions may be modelled in dowelling, two sizes being used, and the larger size having the lower ends shaped as indicated. A simulation of piping can be had by covering the upper lengths of dowelling with a round of cartridge paper projecting sufficiently in an upward direction to give this impression. The screen behind the smokeboxes may be executed in imitation corrugated iron sheeting, by scribing lines on thin wood or medium cardboard and painting aluminium. There is a louvred roof on

the boiler-house. Piping throughout is represented by $\frac{1}{8}$-in. wire having soldered washers to suggest flanges. For an O-gauge model a heavier wire may be used. Suitable smokebox fittings for this scale can also be obtained. The mixing tanks can, for OO-gauge, be formed from lengths of postal tube, which should be covered with cartridge paper, glued only on the edges where they overlap, and stretched tightly over the surface. This will afford a good covering to take a red oxide paint. The shaping of the tops of the tanks is shown in the plan, and the placing of the small angular projecting supports is a work requiring care. Altogether, however, the model is one which presents few difficulties, and which offers at least a few traffic facilities, while providing in itself an excellent scenic feature. If water-troughs are not being modelled, the best position for the plant is at some point adjacent to a large engine depot.

A number of small trackside features are next in order. Fences (Fig. 194) for the permanent way are best made of $\frac{1}{8}$-in. square brass-strip, forced into holes bored at regular intervals. Where the elevation to be fenced is irregular (Fig. 195), as along the top of a cutting, these posts may come right down to the baseboard itself, being arranged to pass through the embankment material. The rails consist of thin iron wire soldered to the posts, the exact height being secured by starting with the lowest rail and inserting a piece of $\frac{1}{8}$-in. wood-strip as a gauge. When the

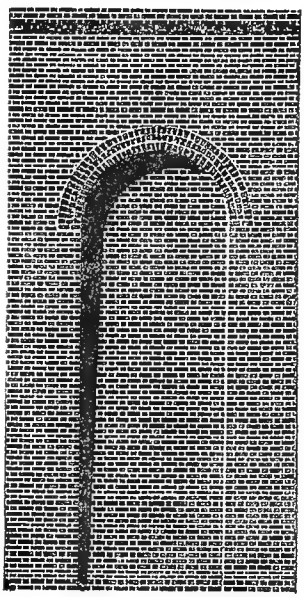


Fig. 190.—How to shade brick-paper for retaining-wall work, etc.

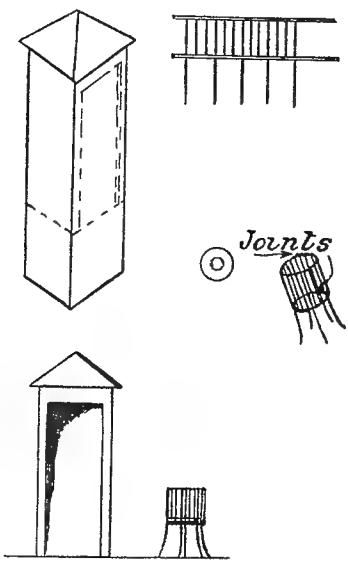


Fig. 191.—Hut and brazier.

lowest rail is in, the gauge wood is rested on this and the second fitted. If there is to be a fence in an inaccessible corner, a good plan is to make the fence before fixing it, and this is best done by using brass running rail for the whole construction. A rail-jig may be used for fixing the top rail to the posts, and the lower rail (there being two only) is soldered on with the aid of a piece of $\frac{1}{4}$-in. stripwood for a gauge. With such a fence—which looks very well when painted white—it is necessary only to have every fourth or fifth post long enough to come down into the baseboard, the others being of just sufficient length to reach the ground surface.

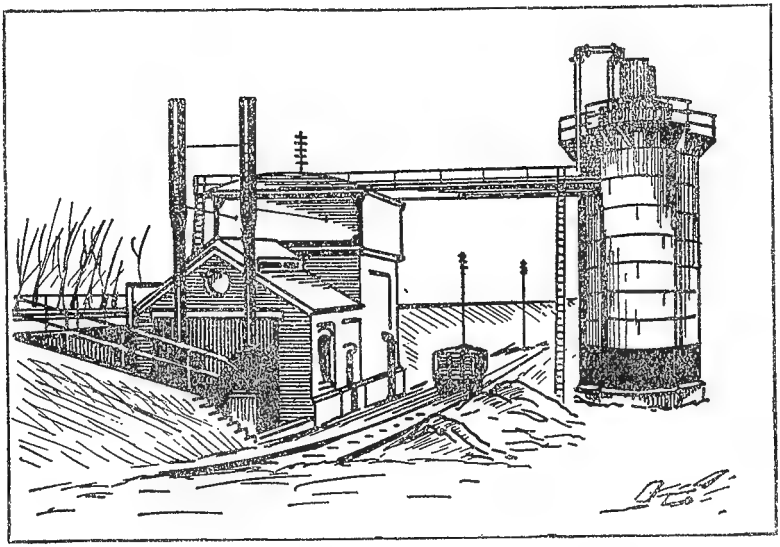


Fig. 192.—Sketch of water-softening plant.

This fencing can be very conveniently bent laterally for curves. A field gate, as in Fig. 194, has usually five horizontal bars. Other sketches show gradient posts (Fig. 197), mile posts (Fig. 198), and commencement and termination temporary signs for a section of track under repair or defective (Fig. 199). All these are of soldered metal, painted white and lattered black. The telegraph post and instrument box (Fig. 196) is not often modelled. A fogman's hut, resting at a tilted angle, as when not in use, is shown in Fig. 200, and in Fig. 201 we have a gravel bin for the trackside. The platelayers' trolley (Fig. 202) is made entirely of metal, and is arranged so that the body slips over a couple of pairs of spoked wheels. When not in use the trolley is stored by the trackside in a dismantled condition. It should be painted black. The same colour is given to the platelayers' hut (Fig. 203), made either solid or built up in card, and having a chimney-stack covered with brick-paper. The whistle sign (Fig. 204) is of metal, a plain piece of tinplate forming the

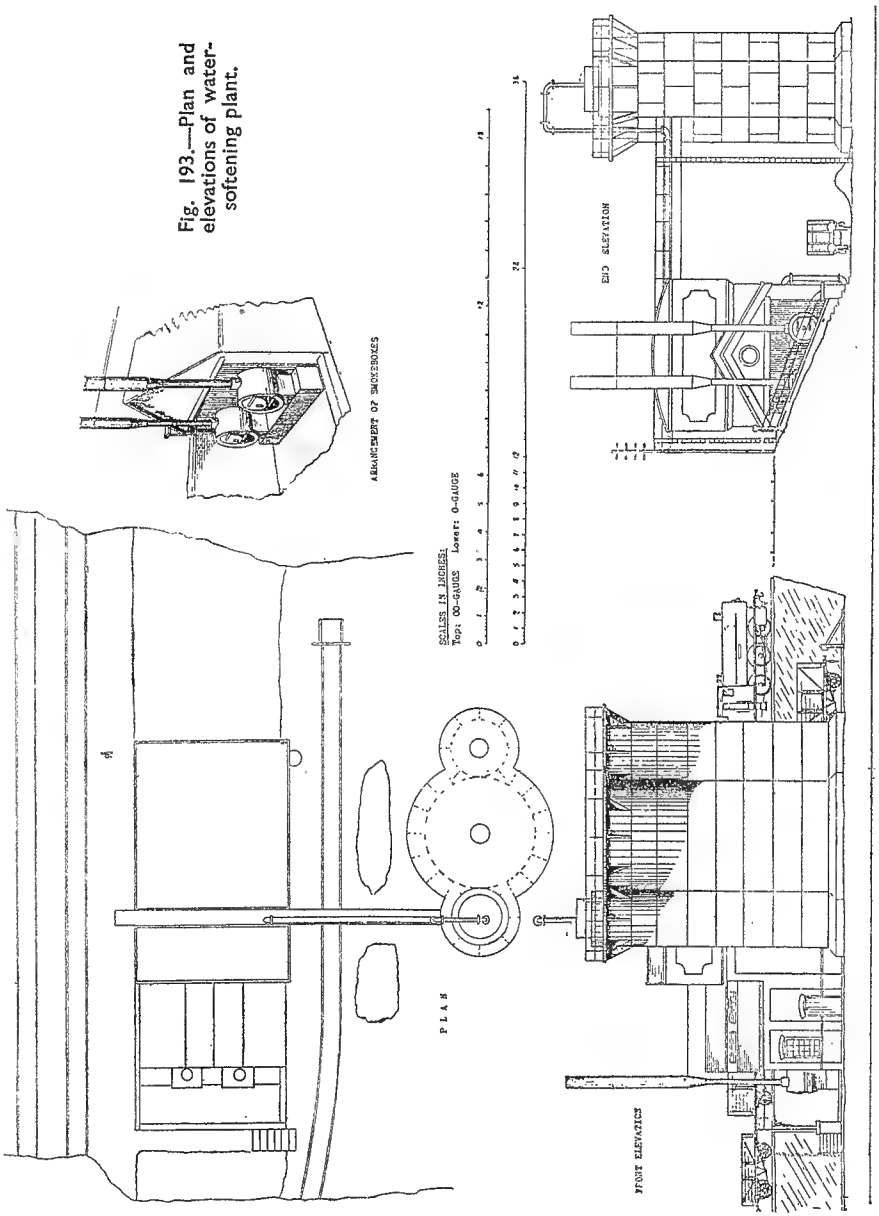


Fig. 193.—Plan and elevations of water-softening plant.

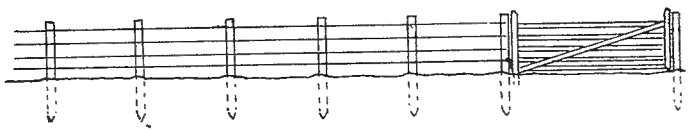


Fig. 194.

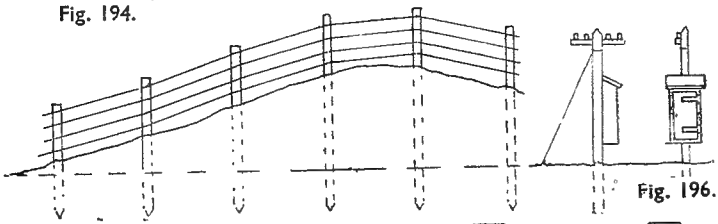


Fig. 195.

Fig. 196.

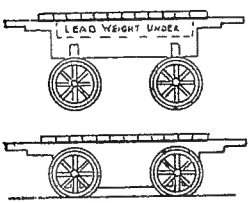


Fig. 202.

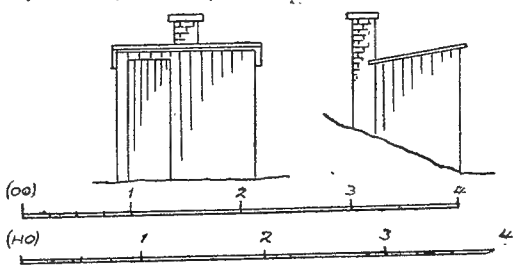


Fig. 203.

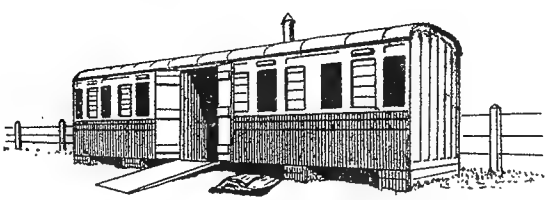


Fig. 205.

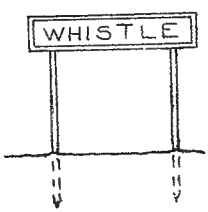


Fig. 204.

Fig. 197.

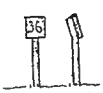


Fig. 198.

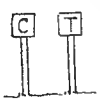


Fig. 199.

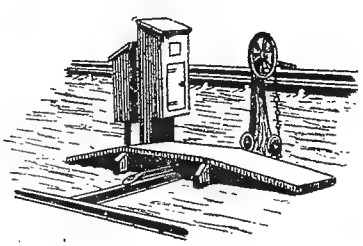


Fig. 206.

Fig. 201.

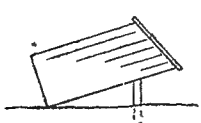


Fig. 200.

board; cage-wire the supports. The sign itself is on the "Merco" sheet. In Fig. 205 we have a disused coach body used as an office, a workshop, or a first-aid depot. It should be set on battens or sleepers as shown. The fog-signalling apparatus (Fig. 206) is easily modelled in wood and wire, with a Leeds brake wheel for the crank gear. Such details greatly increase the attractiveness of a layout.

Too much space must not be given to the subject of factories, though in these small gauges, of course, such adjuncts to the layout have an importance of their

Figs. 207 and 208.

own. The effectiveness and usefulness of these industrial centres on a layout are very real, as they form in themselves traffic centres as important as small goods stations. Photos show such centres on the author's layouts. The simplest expedients were resorted to in the building of these models. A design for a small building of such an order is given in Fig. 207, where a country flour-mill is represented. An old style of windmill might be erected to adjoin, though this is not necessary, and, of course, is rarely seen to-day. The wagon repairs depot (Fig. 208) is also depicted in one of the photos. The loading and unloading gantry —one side of which spans the track and the other the open roadway, the top members passing right through the building—is formed of rail. Ships' blocks and sheaves are used for the tackle.

The limeworks (Fig. 209) formed a quite well-known feature on the old West Midland layout. There is nothing in the model that cost a penny, unless it was a sheet of pins. The kilns are empty Vim boxes. Old wire, a clock wheel, and a broken bogie helped with the rest of the model.

A timber yard is a useful side concern, and I have arranged for a number of drawings descriptive of the individual items for such a department. The timber yard itself may be arranged to taste, or to suit conditions. The buildings necessary include boiler-house, sawmill, derrick crane, stabling, seasoning sheds, office, and

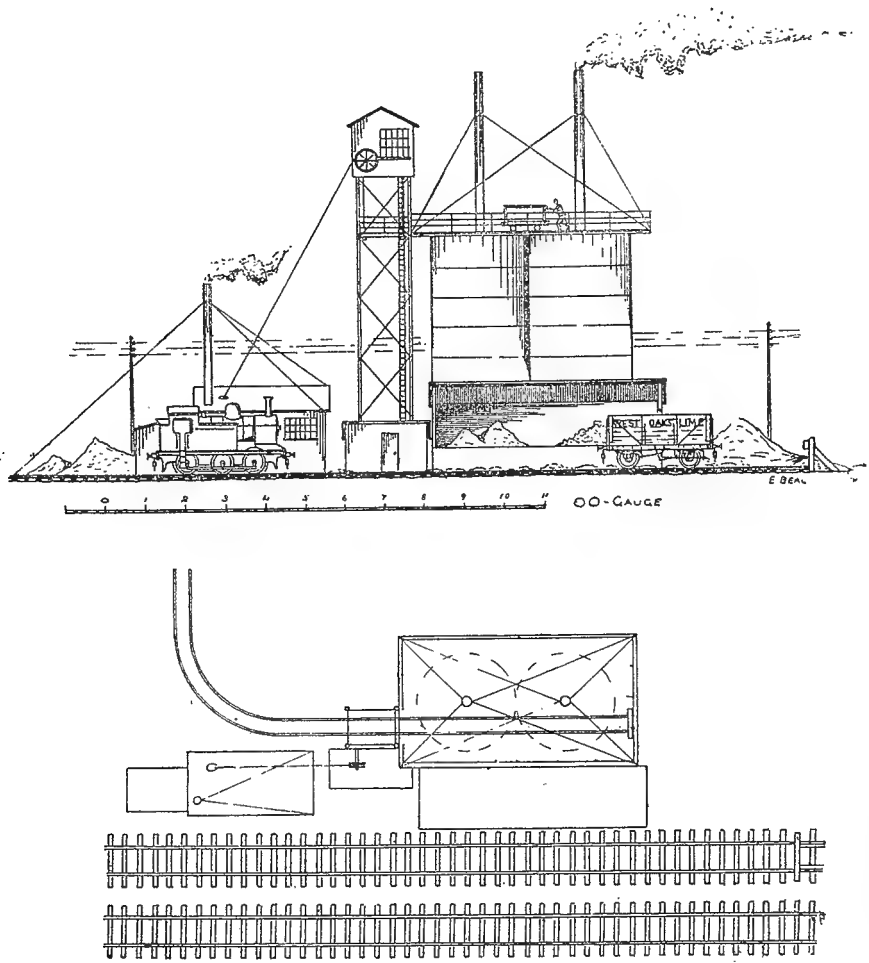


Fig. 209.—Elevation and plan of model lime works.

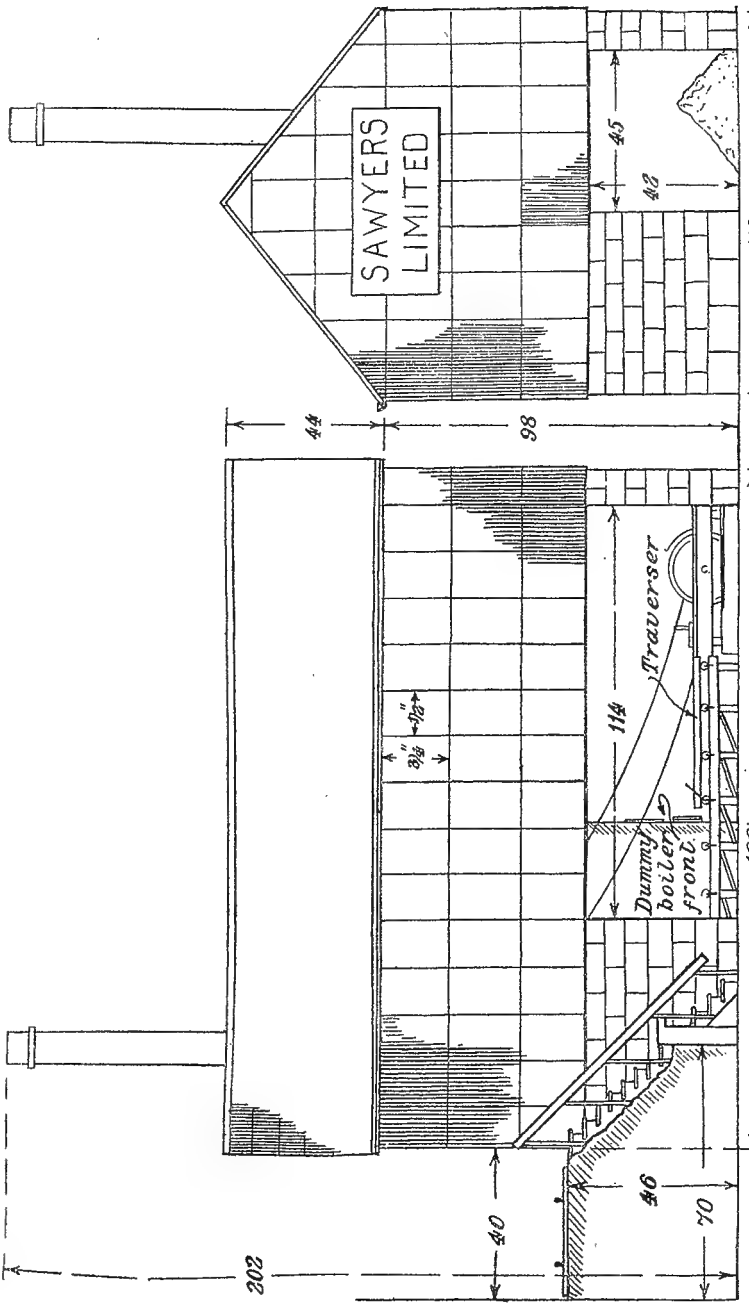


Fig. 210.—Front and side elevations of the sawmill.

the usual items of stacks of timber and logs. The railway siding may enter the yard at any point, front or rear, high level or low. In Fig. 210 we have the boiler-house and sawmill, the latter having a circular saw for the cutting up of trees. The next figure shows the derrick and the stable. The former is mainly of strip-wood, though strip-brass would be easier to handle for the jib and pulley gear. The cut-off ends of OO-gauge couplers, consisting of strip with holes already drilled, are useful for soldering on the sides of jib to take pulleys. The mechanism of the crane is clearly shown in the diagram. An adjustable pawl may be made of flattened wire to form a locking device for the hoist, so that loads can be retained at any given point. Ships' blocks form the tackle, and finest ships' chain is used This will work quite admirably if it is kept well oiled with cycle lubricant along the whole of its length, but not unless. It may be necessary to enlarge slightly the holes in the blocks. A model identical with this one was in regular service on the late West Midland lines for over four years. The seasoning shed (Fig. 212) is a detailed job, but exceedingly effective when modelled. Such a shed looks better the larger it is made. Postal card-strip may be used for the slats, and each wall is modelled separately. A better job could be made by using very fine strip-brass : but beware of getting the slats out of scale. There is a light cardboard floor, which may be glued and covered with earth-dust. Flat timbers may be stacked in the triangular arrangement exactly as shown, to any desired height, and will retain their level. Other timbers may be represented in stripwood as indicated.

For a coal mine (Fig. 213), a design is included which is arranged to fit as far back as possible on the baseboard against a wall. This should occupy about 8 or 9 in., and the central building is intended to project beyond the rest, coming right forward with a merely narrow space for a double main line to pass. From the left, the buildings are the power-house and winding room, pithead gear, screenery and distributing plant, washery. The wheels of the headgear are a pair of Britain's gig-wheels. The winding cords are stuck with Certofix to the circumference of each wheel. Chimney-stacks are of coiled paper inserted into empty phial cartons at the base, and thus affixed. The upper hopper of the washery is formed by using a small tinplate funnel. Most of the buildings are of black woodwork. Brick may be used for the power-house and the washery building. The trestle-work of the winding gear is, of course, done in rail.

Enough has been said to give some idea of the method of constructing goods and transit sheds suitable for a model dock in conjunction with a railway. We will, therefore, confine ourselves to a number of small details for the formation and furnishing of a dock site. The simulation of water is best carried out in sheet glass as in Fig. 220. The dock may be of any depth, varying from $\frac{3}{4}$ to $1\frac{1}{2}$ in. If a deeper depth than that of the baseboard thickness is required, there will have to be a framework of layers of planking on the underside of the latter to give the

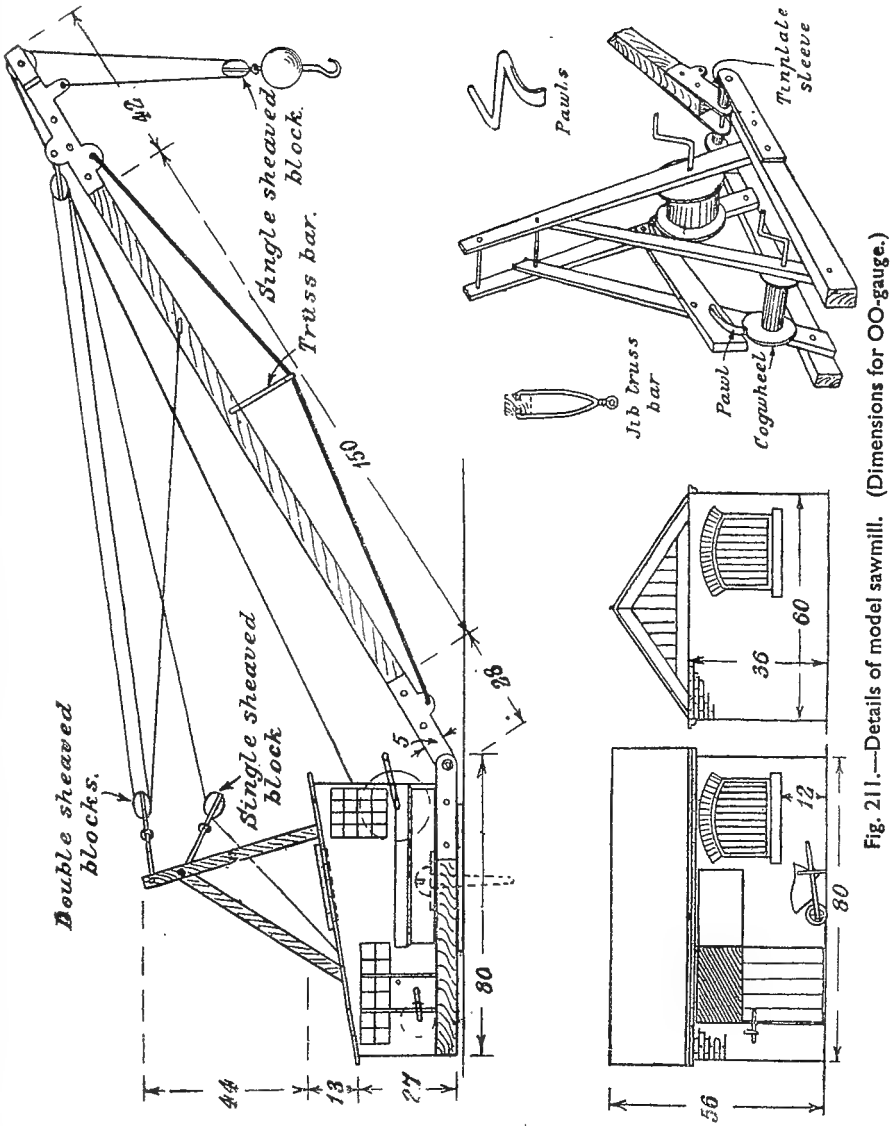


Fig. 211.—Details of model sawmill. (Dimensions for OO-gauge.)

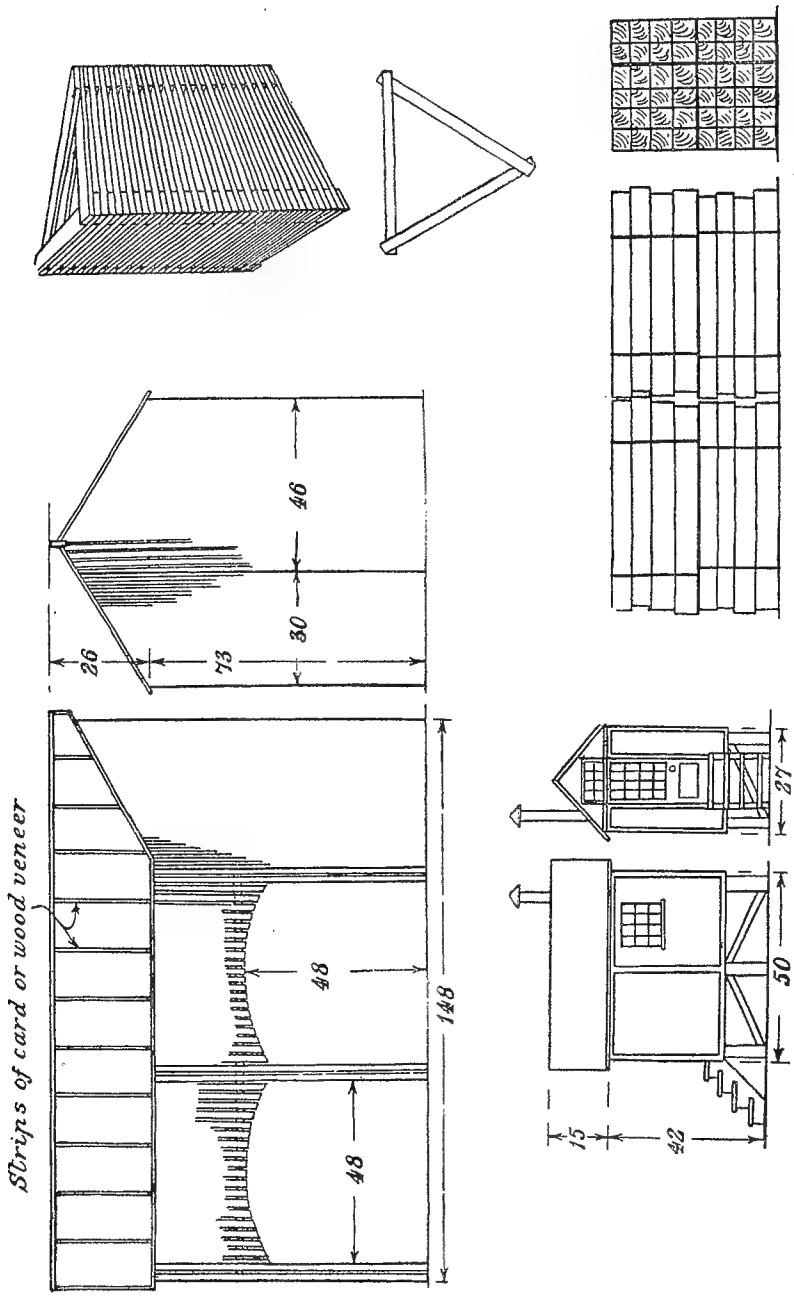


Fig. 212.—Details for model sawmill.

distance. This is included in the sketch. The basin is formed by removing a length or two of the floorboards from the baseboard itself, to form the cavity. Then the base is covered with plywood, which in turn has a covering of thin card to take the colour (plywood shows the grain through paint), and above this is laid, in one large piece if possible, the glass, which should be the thickest variety. The card is painted a dark greeny brown, and in one corner there may be sprinkled a few grains of grass-green sawdust before the glass is laid. The dock wall may be either covered with old stone-paper (Fig. 214) or done in dead-black wood, with imitation projecting timbers in stripwood. The stone wall may be perpendicular, but the

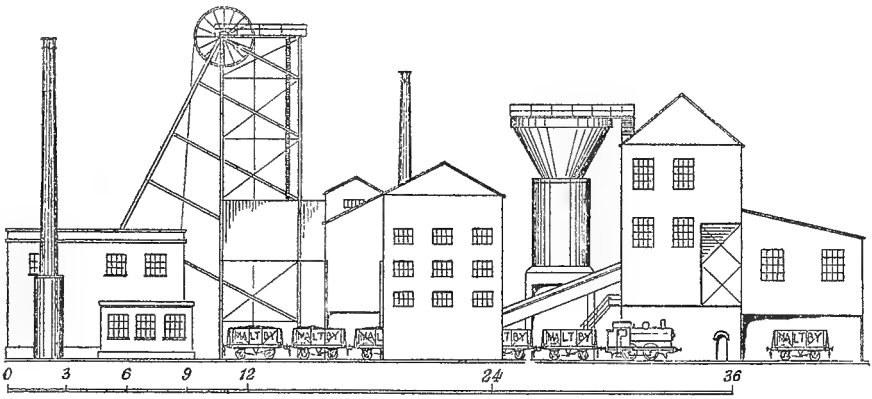


Fig. 213.—Design for coal mine.

woodwork wall should be sloping. The constructional work is really quite easy, but the effect most arresting. A waterman's stairway, as in Fig. 214, may be added. Bollards (Fig. 215) should be set at regular intervals for the mooring of vessels. Use dowelling for these, first boring holes to insert this. The base is of card slipped over the top, then the caps are added. The capstan (Fig. 217) appears at each end of the basin, and is made in the design by using one of Woolworth's curtain pulleys and two golf tees cut short, the latter being drilled and a panel pin driven right through. The base is a wagon wheel. Lifebuoy covers are made of wood and card (Fig. 216). Fig. 218 shows a section of chain-fence which is very useful at points where road traffic has to be kept back from danger points. The posts are of $\frac{1}{8}$-in. brass-strip, drilled near the top for the chain. A wheeled gangway is easily made from a piece of stripwood, soldered wire, and a pair of Leeds brake wheels. The harbour-master's office, finished as concrete, has a roof made from a Handicrafts wooden cap covered with slate-paper. The flagpole is of cage-wire with a soldered truck at the top. The clock for the tide-time is from the " Merco " sheet, and a lifebuoy receptacle is placed at one end of the building.

In the early editions of this handbook no reference was made to model signalling. It was felt that within the restrictions then required no treatment could be given of sufficient brevity that would not appear trivial. Little more can be anticipated now. For the benefit of beginners, however, it may be briefly stated that the two principal types of semaphore signalling employed on actual railways—the Block System and the Track Circuit System—lend themselves admirably to the exigencies of railway modelling. In actual practice, the Block System divides the

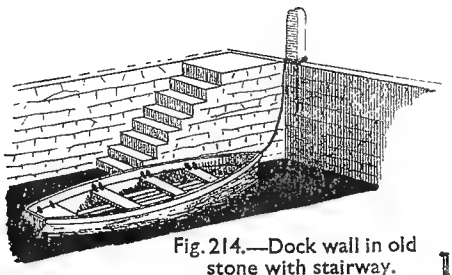


Fig. 214.—Dock wall in old stone with stairway.

Fig. 215.—Bollards.

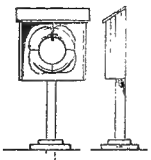


Fig. 216.—Lifebuoy.

Fig. 217.—Capstan.

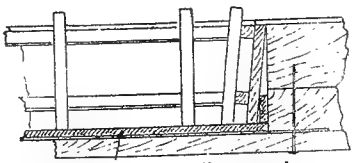


Fig. 220.—Dock walls in timber, showing glass surface.

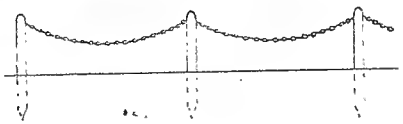


Fig. 218.—Chain fencing.

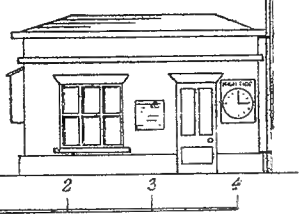


Fig. 219. Dockmaster's office.

Fig. 221.—Wheeled gangway.

line into blocks or sections, each under the control of a signal cabin. When a train has been admitted to the block, a stop signal is given behind it at the entrance to the block until the block is clear, or until the block or blocks ahead are clear. The placing of cabins and signals for blocks is also necessarily modified by the occurrence of junctions and entrances to yards. On a model layout, the lever-frames may be actually located within the respective cabins, and for the miniature scales there has been ample provision of the necessary appliances. The most recent and acceptable method of operating the signals is undoubtedly by the use of a fine steel springy wire passing through copper tubing of very small calibre. This can be laid either on the surface of the baseboard or arranged beneath. This dispenses with the use of tiny angle-cranks to a very large extent; it will be found that

where several of these cranks occur consecutively there is considerable loss of pull by reason of the mere looseness of the wires in the holes of the cranks. The tubing method abolishes the bugbear immediately, as it does also when applied, with much better acceptance, to point-operation by hand. But beyond all question the most ideal mode of operating small-scale signals is to employ electric power.

This brings us to the subject of Track Circuiting which, though not essential in the electric operation of model signals, is probably the most suitable method. In actual Track Circuiting, certain sections of the permanent way are used to form a closed circuit for the manipulation of power appliances which regulate the movements of signals. Model signals may be thus operated, and may also be interlocked with point movements by the introduction of a simple two-way switch on the point-rod, this switch feeding the current to the magnets of the signals involved.

In real practice, each home signal is provided with a fish-tailed repeating semaphore some distance ahead called a distant signal. In modelling, however, the restrictions of space most frequently render the installation of distant signals impossible. Starting signals are placed at the outer ends of all departure platforms and at the exit of every siding leading immediately into a main line, the latter signal being always interlocked with the point or catch-point. Trains cannot begin their journeys without the permission of these starters. All the necessary fittings and parts for the complete building-up of small-scale semaphores are on the market, as also are admirable electric magnet signal outfits.

Several varieties of light signals have also been in regular use on British railways for many years. Here, the semaphore is abandoned in favour of lights, sometimes of the two-aspect, more frequently of the three-aspect, much akin to the public highway crossing signals. The difficulty in the small modelling scales has been that of securing electric lamps of a size sufficiently diminutive. Recently, such lamps have been obtainable, disproportionate only in a slight excess of length. Operation of both two-aspect and three-aspect types can of course be much the same as with track-circuited semaphores. Current can be fed from solenoid-switches or relays operated by a momentary touch of the locomotive collecting shoes in passing over an inch-long isolated section of the conductor rail. For fuller details of signalling, however, the subject being so vast, the reader must be referred to the admirable books upon the subject, and to the writer's own books in which the whole theme is considered at much greater length.

CHAPTER V

ROLLING STOCK AND MOTIVE POWER

THE whole question of rolling stock for HO- and OO-gauges is a theme requiring special treatment, differing entirely from the same branch of modelling work in the larger scales. Vehicles in these minute scales are of necessity somewhat light—though much may be done to overcome this drawback—and consequently additional care requires to be taken to ensure that derailments will not be a frequent and tantalising occurrence. After having arrived at a point of perfection so far as loco. appearance is concerned, manufacturers have given great regard to the matter of reliable running, with the result that it is now possible to have operating success in this scale proportionately satisfactory and always improving.

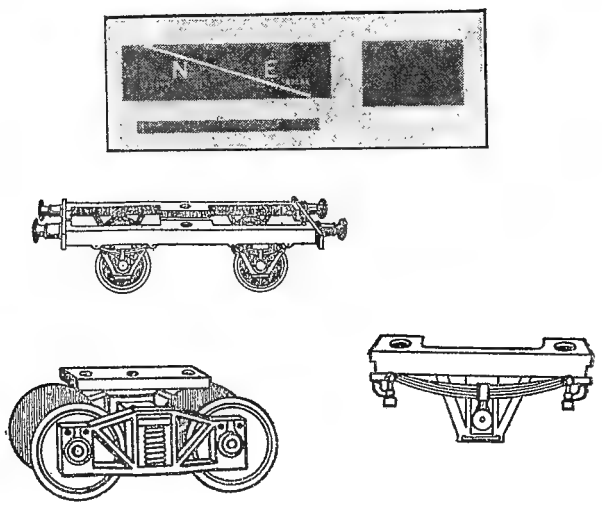
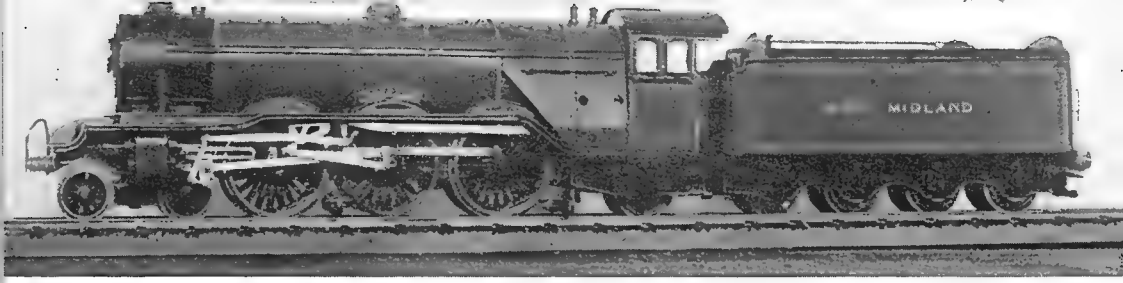


Fig. 222.

A number of photos show typical examples of commercial products in goods stock. One gives a picture of what can be done and is being done in the way of perfect realism. The train of wagons, built by an amateur from lithographed paper sides and standard parts, with the addition of super-detail adornments carried out by the builder himself, is creditable in the extreme and compares well with anything hitherto produced on similar lines in the larger gauges. Fig. 222 is a collection of photos and sketches of certain components obtainable—by no means an exhaustive one. Complete chassis, bogies in solid brass and white metal, integrally cast solebars and axle-guards, buffers, couplers, a very extensive range of wooden parts

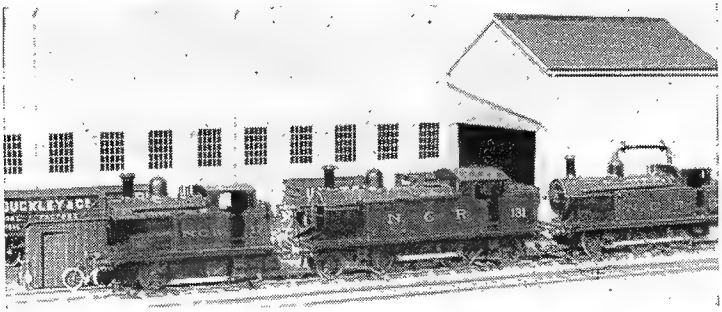


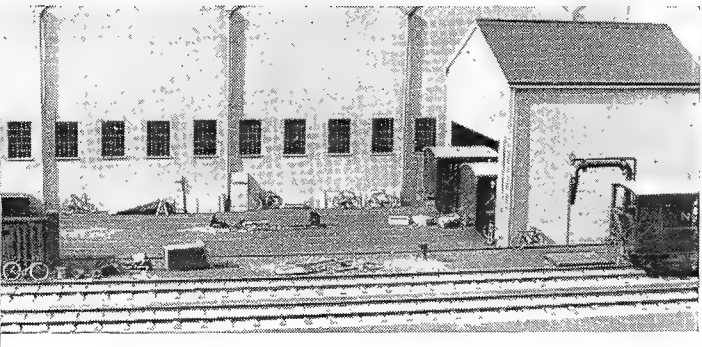
The author's " Pacific " locomotive from an early L.N.E.R. prototype.

Above : The first W.M.R. freight shed, now on Captain Fleetwood-Shawe's layout.

Below : A street scene on the West Midland (1940).

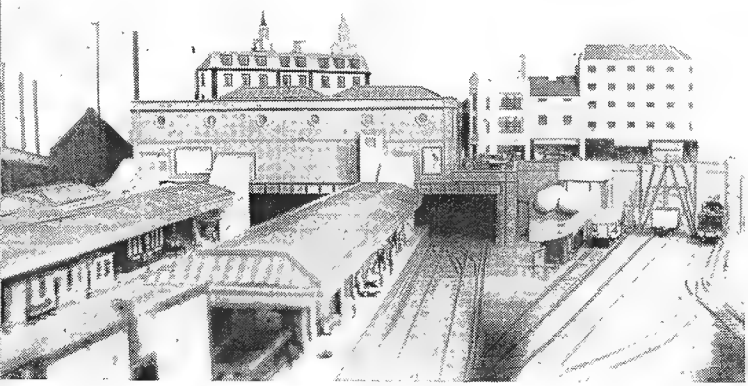
Three of the North Central tank locomotives, made from Stewart - Reidpath cast bodies.





A view in the yard of the warehouse. Note six bicycles, a wheelbarrow, hand winch, packing-case lids, brazier, overturned hut and water crane. All home made.

An L.M.S. (Midland) 2-4-0 engine, by Walkers & Holtzapffel. Note the cab fittings.



Minchester Station Concourse and part of the town on the North Central Railway.

Scenes on the 4-mm. scale North Central Railway, owned by Mr. Vacy Ash.

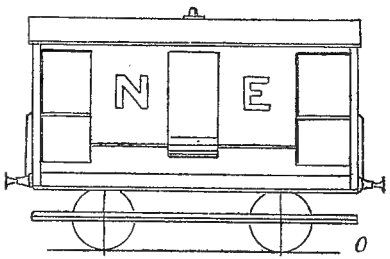
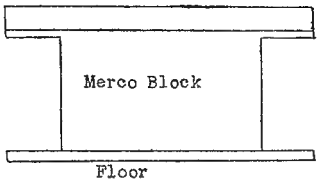
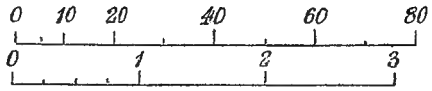


Fig. 223.—N.E. brake.





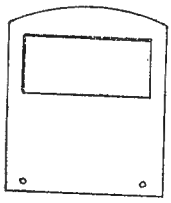


Fig. 225.—Wood and cardboard parts for N.E. brake van.

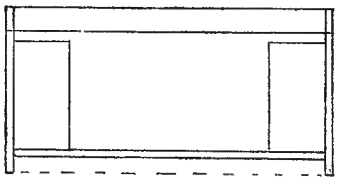


Fig. 224.

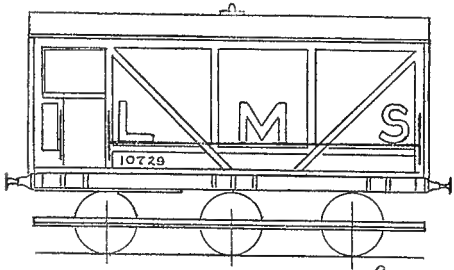
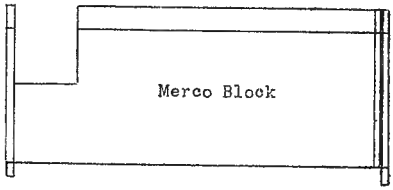
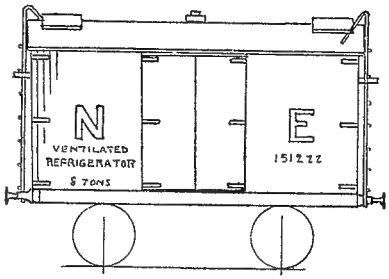


Fig. 226.—L.M.S. brake.





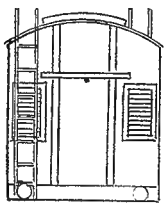


Fig. 227.—N.E. refrigerator.

for open and covered wagons, and a most admirable selection of scale-designed lithograph paper sides can now be had. Typical examples of these paper sides in goods and passenger style are illustrated, as well as a "long" type axle-guard, a complete chassis by Stewart-Reidpath Ltd., and one of their diamond-frame bogies. An excellent solid brass bogie is produced by Hamblings of London, and the manufacturers now retail properly cut and drilled wooden components for open wagons and solid body vans, the latter a most convenient accessory, providing a labour-saving body on which to fix the litho papers and having an ingenious

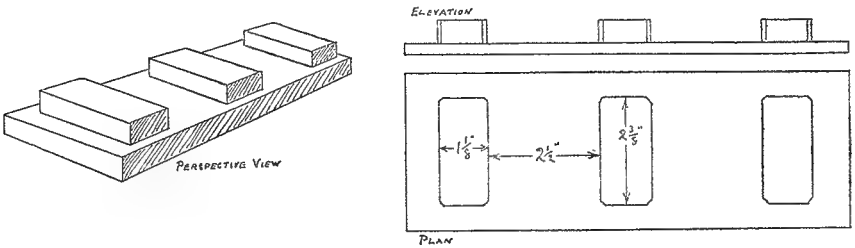


Fig. 228.—Jig for wagon bodies.

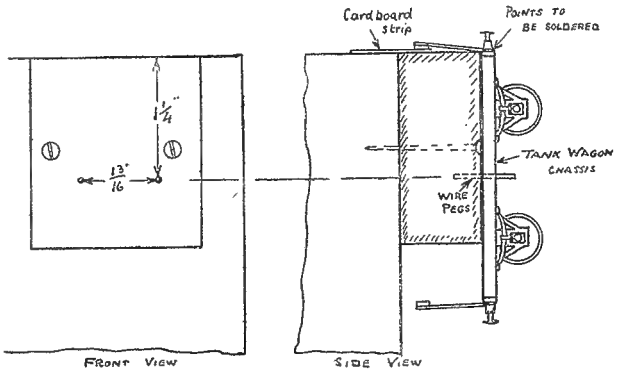


Fig. 229.—Jig for fixing tank wagon ends.

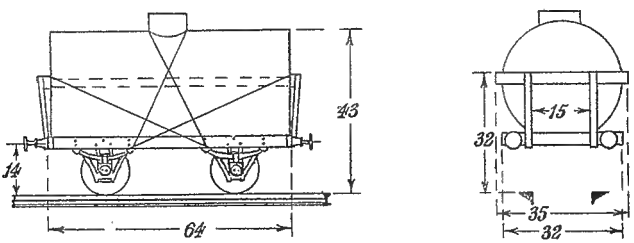


Fig. 230.—Details for constructing tank wagons.

arrangement whereby the buffer beams are now included on the main body itself thus ensuring an additional amount of weight which, while not excessive, is enough to give stability (see Figs. 224 and 225).

The litho sides themselves were largely designed by the writer from details obtained from official sources. They are accurately to scale and include N.E. open, refrigerator, bogie covfit, fish and fruit wagons, and brake van ; L.M.S. open, meat wagons, and brake ; S.R. open wagon, vans, and brake ; G.W.R. bogie Mink, Damo B, open, banana, and brake wagons. There are also some very attractive

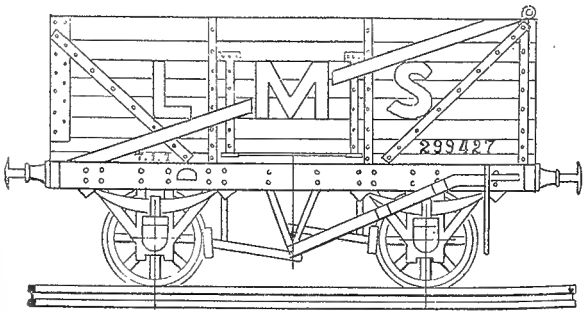


Fig. 231.—Full size drawing of L.M.S. open wagon fitted with full brake gear.

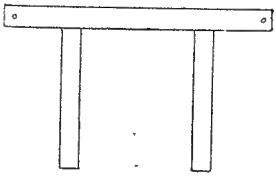


Fig. 232.

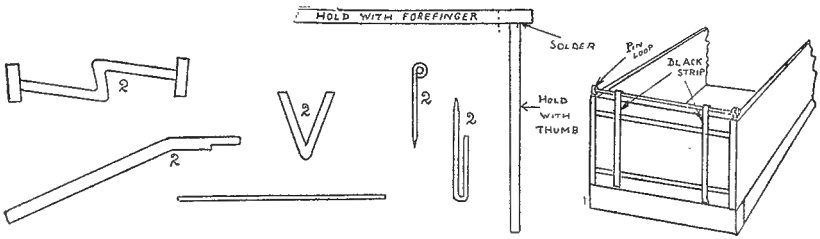


Fig. 234.—Brake details.

Fig. 233.

tank wagon covers with solebar details, and these are sent out in tubes which are intended for the foundation of the tanks themselves. Several private owners' wagons are also included in the series.

Passing on to some further drawings, we have suggested details for building up litho wagons. Fig. 228 gives a suggestion for the design of a most convenient jig for the building-up of open-wagon bodies. A perspective sketch, a plan, and an elevation of the structure are given. The jig consists of a piece of floorboard or other suitable material on which are attached three blocks of wood, each exactly the same size, so dimensioned as to fit precisely into the inside of the wagon so that the inverted floor lies flat on the top. The requisite measurements are all included. On completion of the jig, the corners of each small block are chamfered

off so that the moist glue on the wagon corners will not adhere. The necessary side pieces and ends of the body are cut to size in either very thin plywood or cardboard—they may be had commercially either all ready drilled for the screws in the floors and the buffers in the ends—and these are lightly glued and set in place around one of the blocks. When everything is square and correct, but not before, a broad elastic band is slipped over the outside and the body left to set while the

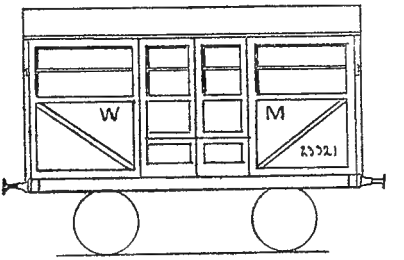


Fig. 235.—Standard cattle van.

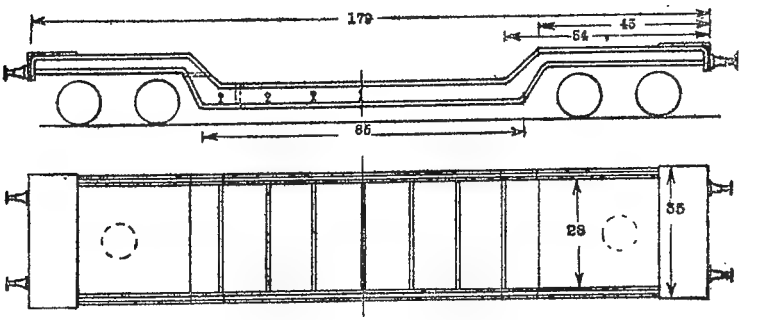


Fig. 236.—Well-wagon. (OO-gauge.)

next, and the one following, are done in the same manner. By this time, the first one ought to be dry and may be removed. It is well to have a proper jig for each type of wagon to be made, so far as the depth of the body is concerned. The next process is to dip the entire body in a tin of reasonably thin flat-drying black paint and lay it upon a sheet of newspaper, with others, to dry. The axle-guards and solebars are then screwed in place while the body is once more put over the jig. This consists of screwing in a pair of screws only, the wheels, of course, being first in place. The buffers are then screwed in tightly (these having been lightly set in already). Last of all, the litho sides are stuck on. All that now remains is to fit the couplers and the wagon is complete.

In Fig. 223 we have a design for a N.E. brake van—a somewhat difficult but very effective model—and the work can be greatly expedited by making the body

in solid wooden van block, out of which two notches should be cut as indicated. This secures the continuation of the roof. The end of the wagon (Fig. 224) is shaped out of cardboard and fixed over the body block, and it is well to stick on the inside litho cover of the body before doing this. A similar block is used, though of longer dimensions, for the L.M.S. brake shown in Fig. 226. In buying blocks for solid vans of the common type, a great advantage is secured in that the woodwork is so arranged as to include the actual headstocks of the van, already pierced for buffers; and if a LaNaL uncoupling device (to be later described) is to be fitted, these wooden headstocks are really necessary. For the steps of brake vans it is well to use tinplate crossover sleepers for the top steps, of desired length, and to solder these to the underside of the solebar. For the lower step, fine brass angle $\frac{1}{8}$ in. by $\frac{1}{8}$ in. may be filed down to suit, and really makes a good finish. The strip is soldered to the axle-boxes, with a piece of stripwood to act as a gauge between the upper and lower steps. Handrails consist of thin wire soldered to pins bent correctly to shape and forced into the woodwork. A useful component for van work is the ready-cut thin card roof cover.

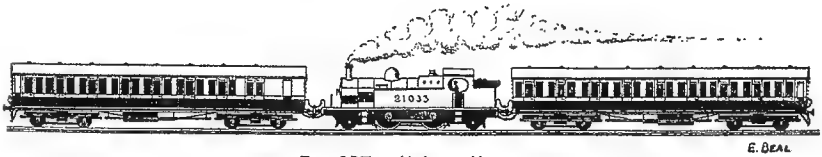


Fig. 237.—"Auto."

Other sketches show wagons involving certain detail work. Refrigerator van ladders are of pins (Fig. 227), and are soldered to buffers. Fig. 229 gives a good suggestion for a tank-wagon jig to hold the wagon while the end retainers are soldered to the buffer beams, the latter being of brass as in the standard chassis. In Fig. 230 we have a sketch of a standard tank wagon. The tank should rest on bearers made of rail, lying flat across the ends of the chassis, each end bent down at right angles. For this wagon it is best to use a complete metal chassis, with brass buffer beams as sold. The tank retainers for the ends are of rail, and a full-size sketch (Fig. 232) for these is given. After the lower ends of the uprights have been given a slight bend to throw outwards the retainer, these are soldered on the chassis. The fitting of the manhole support is best carried out after the tank has been completed and covered with the papers. A small hole in the centre is enlarged with a lead pencil until it is big enough to take a length of $\frac{3}{8}$-in. dowelling, which must be long enough to reach the base of tank inside. This is then glued in place and the cover papers added. A coach vent top in the top of this dowelling will give a finishing touch. All the metal work on the tank wagons, including the wire stays should be given a coat of flat light buff paint to match the tanks. Then the solebar

covers are added. The dowelling in the tank makes a good support for the coupler pins underneath. A photo depicts an O-gauge tank wagon, with extremely refined detail, showing the arrangement of oil-pipes at the ends. Fig. 231 is a full-size drawing of an OO-gauge L.M.S. litho open wagon, complete with all dummy brake-gear. But we shall revert to this subject later.

An illustration of a hand-made cattle van is given also (Fig. 235). The procedure here is much the same as for an open wagon until the roof is fitted. Special solid roofs will be sold for these vans, but as an alternative use can be made of a piece of " Merco " passenger coach roof section. This is set inside the shaped ends and entirely eliminates the difficulty of forming a substantial roof, at the same time allowing for open sides. The side frame-members are made of card-strip, like those on the ends. A thin card cover goes over the solid roof, and the roof itself has a sufficient depth to furnish a soffit for the side members to rest upon. The

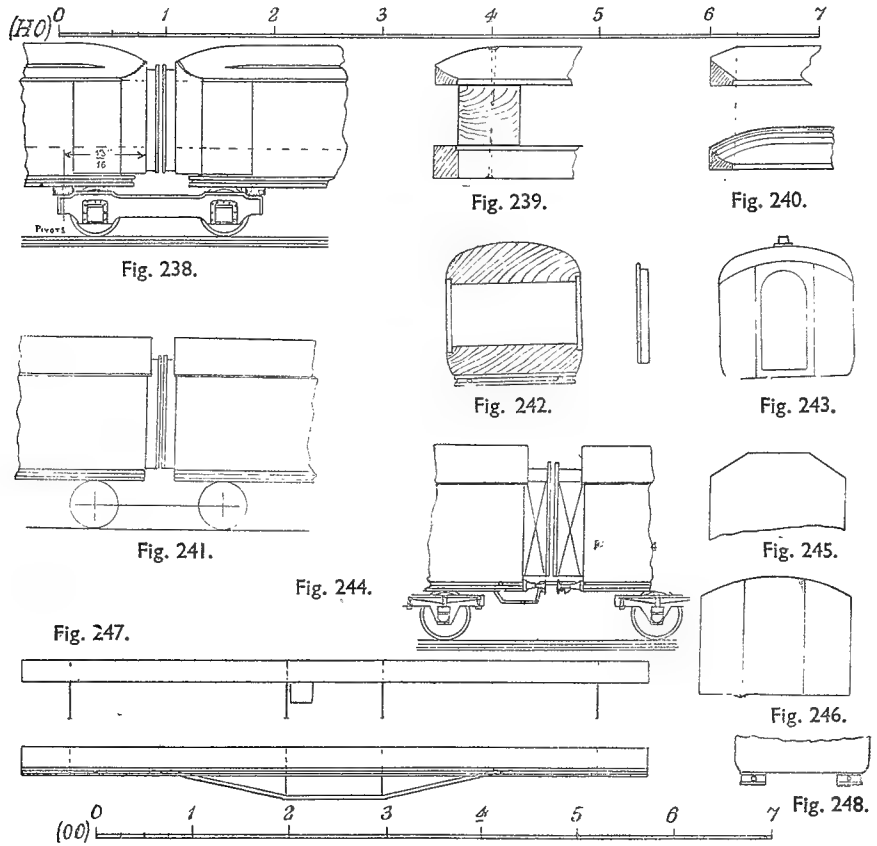


Fig. 238.

Fig. 239.

Fig. 240.

Fig. 241.

Fig. 242.

Fig. 243.

Fig. 244.

Fig. 245.

Fig. 246.

Fig. 247.

Fig. 248.

cattle-rail is of thin wire, running right through the length of the van and trimmed off at the ends. One of the photos shows a train of cattle vans made after this style.

An excellent well-wagon may be constructed from brass rail, as shown in the photo. The first attempt may be found somewhat difficult, but with practice the method is extremely satisfactory. Turning to Fig. 236 we see that each side member of the vehicle is formed from rail, lying flat, with a bit of $\frac{1}{32}$-in. plywood, properly shaped, inserted in the web of the rail, as in the instance of the turntable already described. The rail is permanently retained so as to hold the plywood by soldering cross-strips of metal behind it as the dotted lines indicate. The wooden side must be a very exact fit at every point, and the pair should, if possible, be cut at one stroke of the knife. The floor of the vehicle is of tinplate above the bogies, this being soldered to the rail, fitting behind the wooden side. In soldering, lay the sides flat on their edges, with a piece of cardboard for a fitting template underneath, between the two sides, the floor resting on the cardboard. This will ensure rectangularity. The well floor consists of rail-made cross-members, the rail set on its edge. This, also, is soldered. Buffer beams have an integral portion coming over the ends of the vehicle, and are attached to the frame at the ends. The bosses for the bogie pins are soldered in place under the tinplate floor.

It is astonishing what a difference small details make in the work of wagon making. Spoked wheels, costing a very little more than the solid variety, dummy brakes, and top bars to end-door wagons make an inferior creation into an entirely satisfactory one. It is for this reason that some will prefer to have hand-made wagons on their line. This is very interesting work. For modelling strapping I suggest gummed paper which has first been painted dull black and allowed to dry. The same material serves, of course, for corner plates. End-bars are fitted as shown in the sketch (Fig. 233). Here the hinges are formed of pins, through which a length of thin wire is soldered. In hand-made vehicles, of course, the planking on the wagon side is lined out with a brad. It will be found that the parcel-strip corner plates will serve adequately to hold the frame together if the idea of covering the whole side with paper is not favoured. Door handles and levers can be copied in fine wire. The colouring and lettering of hand-made wagons has always been thought a difficulty, but this is not so if certain of the O-gauge Leeds wagon transfers are used. The W.M.R. early wagons were entirely lettered with transfers, and these are a delight to affix. Small $\frac{1}{8}$-in. alphabets can be had for smaller letters like those on the Danby Lime Works wagon, a hand-made model. Very fine lettering can readily be done in white paint with a pen, if the paint is of just the right consistency. White ink is also good, but should be varnished with artists' varnish.

Most excellent and delicate corner plates, with embossed rivets, are to be had from G. N. Slater, of Timperley, Cheshire, as well as some quite admirable shim metal correctly corrugated van-ends. The same manufacturer produces splendid

wagon kits which, like all his work, are carried out with a thoroughly artistic and yet scrupulously accurate touch. Wagon brake gear is now invariably cast as part of the chassis on all the best examples. It is, therefore, unnecessary to waste energy and time in the attempt to build up brake gear, though details are given in Fig. 234.

The standard coupler for OO-gauge is as satisfactory as may be expected, but is not intended for an uncoupler. It is a pleasure to record that the LaNaL Automatic Uncoupler is a thoroughly satisfactory appliance and never fails to do its work. This ingenious mechanism was the invention of Lt. Alan Lake Rice, of Philadelphia, U.S.A., and is shown in one of the photos. By its adoption it is possible to secure perfect coupling and uncoupling by remote control, as well as to carry out fly-shunting and the ordinary breaking-up of goods trains. For locomotives and tank wagons, there is also a special attachment which is soldered on the buffer beam. The coupler is really no more conspicuous than the former one, and in passenger traffic can be attached merely to the ends of permanently coupled trains. The uncoupler is operated by a ramp between the running rails, which is not at all disfiguring, but has the appearance of the ramps generally placed over point mechanisms. The couplers are fitted to the finished wagons after the buffers are in place, and there is no difficulty whatever in this work.

Similar provision is made for passenger-coach construction, and so far as commercial work in passenger stock is concerned, there have been very great improvements. Several photos of these features are given, some of the types illustrated being super-detailed hand-made vehicles, other detailed examples of lithograph work. Both HO and OO are well provided for.

It will be found that the reduction of weight is an important objective in passenger stock building. The old method of using a large amount of glass in the structure had its merits but tended overmuch to heaviness, so that a train of any considerable length could not be hauled up a reasonable gradient. Another early trouble was that of derailment through buffer-locking and coupling defects. Much of the last-mentioned nuisance has been eliminated by more careful designing of accessories, and what remains can be overcome by some tested expedients. One good procedure for short suburban trains is to use the " auto-train " method of permanent coupling (see Fig. 237). A tank locomotive is fitted permanently to coaches, being placed centrally, and a driver's compartment being provided at each end of the train : this abolishes the need of uncoupling and reversing engines also. A still better method is that known as articulation, in which train-sets are made up permanently and a special arrangement of bogies is resorted to, a single bogie being made to serve the two inside ends of every pair of vehicles. This method has a number of real advantages. Close-coupling becomes possible even for sharp curves ; the weight of trains is reduced by almost 30 per cent. ; there is

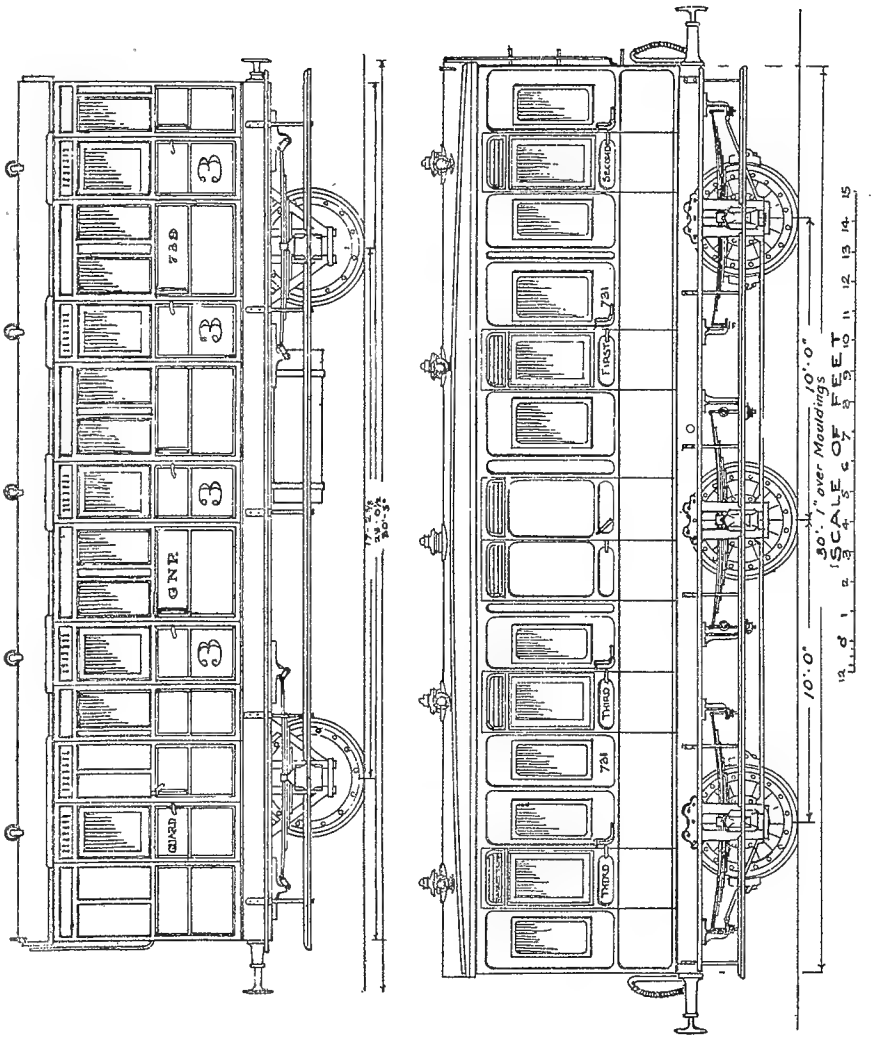


Fig. 249.—4-wheel and 6-wheel suburban coaches.

greater flexibility in running, less spreading of vehicles and consequent damage in case of accidents, greater handiness in placing trains on the track, a considerable reduction in costs of bogies, buffers and couplers, an end of accidental uncoupling on curves, as well as the added realism of actual practice. Trains may consist of articulated sets of two, three, or more coaches, and a special type of articulated bogie is now on the market which has a proper swivelling end bar providing a universal joint. The bogies run most sweetly and are a genuine boon ; they are to be had in several designs. The method of fitting these bogies is shown in Fig. 238. Here the L.N.E.R. design is used along with the coach-end style of that company, and other sketches suggest constructional details for making up coaches from standard wood parts. In Fig. 239 we see how to fit together a shaped roof section and a floor section, these being provided ready shaped and grooved for the celluloid sides. A $\frac{5}{8}$-in. square block of stripwood is inserted and sprigged in place, the work being done on the edge of a mitre-box to ensure symmetry (see Fig. 239).

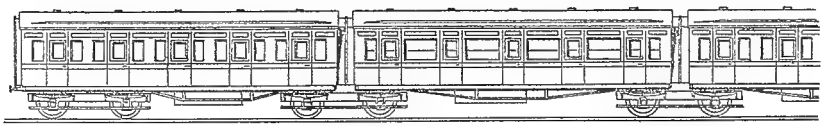


Fig. 250.—Articulated suburban train.

The shaping of a domed roof-end (Fig. 240) is shown, the wood first being cut roughly with a knife and afterwards sandpapered in the palm of the hand. The articulation of a pair of plain-ended vehicles (Fig. 241) is indicated. It will be seen that there is greater flexibility on curves for the shaped coach-end. Fig. 242 shows the sections of roof and floor-pieces and how the celluloid is fitted. In Figs. 243, 245 and 246 we give details of how to secure the angular shape of the ends and to provide a good finish. The plan (Fig. 245) is given, and the dimensions of a cardboard mask for the end (Fig. 246), which is bent by the lines drawn. This end-mask is then attached in place with parcel-strip and glued, and afterwards is shaped with scissors. Articulated trains, of course, have usually only the two extreme ends domed, the rest being plain ; but it makes closer coupling possible if even the inside ends of a coach-set are given an angular shape.

Single vehicles are often domed at both ends. The plain roofs are covered with a piece of drawing-paper of exact width, which is trimmed so as to overlap the plain end about $\frac{1}{32}$-in. to suggest a projecting roof. The shaped floors are made to provide the necessary bow to the sides.

The bodywork being done, attention may be turned to the litho sides. The windows are easily cut out with a safety-razor blade by freehand with a little practice. Do not first cut out the side from the sheet, but cut the windows while you

have enough paper to hold the side by. In the event of windows having rounded corners, a good method is to use a No. O size leather-worker's punch. This operates like a pair of pliers and totally avoids the trouble of getting the razor-cuts right into the corners without cutting through the top edge of the papers. First punch all the window corners and then make the incisions with the razor. A whole side can be cut out in a few minutes. A larger punch to fit the puncher will cut the corridor window corners. The way to stick on the sides is to glue the reverse surface, spreading the glue carefully with a piece of tissue paper for a brush. In cutting the sides, make the top and end-cuts flush with the scissors, but along the bottom leave a white-paper margin of about $\frac{1}{8}$ in. This helps to tie down the side at the base, and is bent over under the body. In gluing, lay on the top edge first, getting it exactly in position, and then press down the rest.

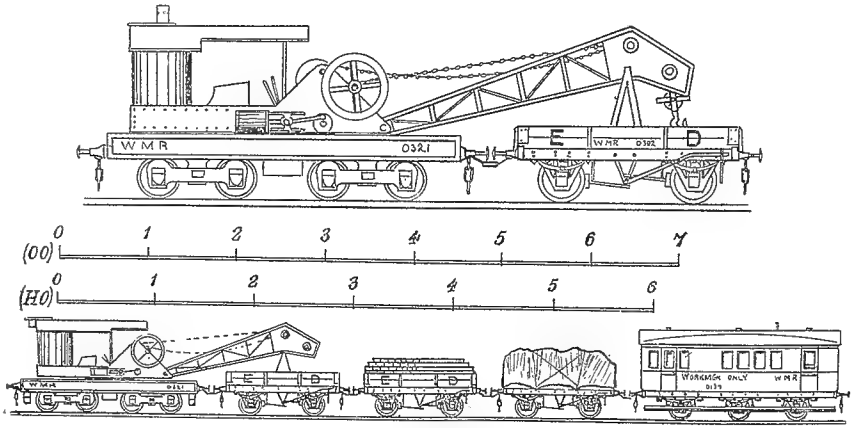


Fig. 251. (Half scale.)

The question of the best glue for attaching papers to celluloid is an important one. Certofix will sometimes peel off after a lapse of time if exposed to the sun. So will Seccotine. Durofix is better for this purpose. If, with the domed end, the litho side is found rather narrow, do not apostrophise the designers of the papers, but simply cut the end up the centre, and the gap will be covered by the corridor connection. In the more recent printings of the lithos, wider ends are given, but only the plain ends were in mind in the earlier papers. Corridor connections are to be separate for each vehicle, and should be made of such a thickness as the sharpest curve of the layout allows. They should come as closely as they may to each other without ever touching. Fig. 244 gives some idea of the spacing required for non-articulated coaches where buffers are employed. A very successful corridor connection is sold by A. W. Hambling & Co. It should be noted that

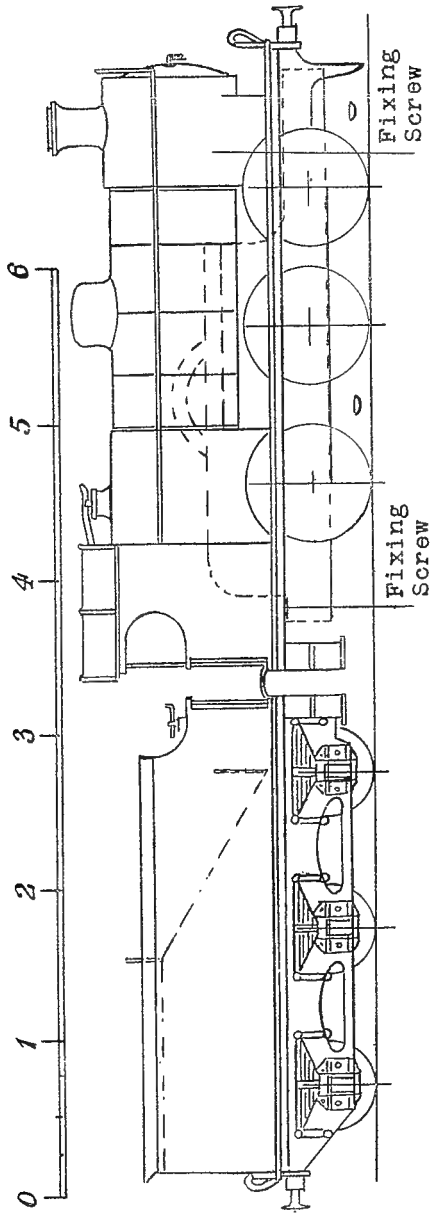


Fig. 252.—Free-lance tender goods with "Reidmere" mechanism.

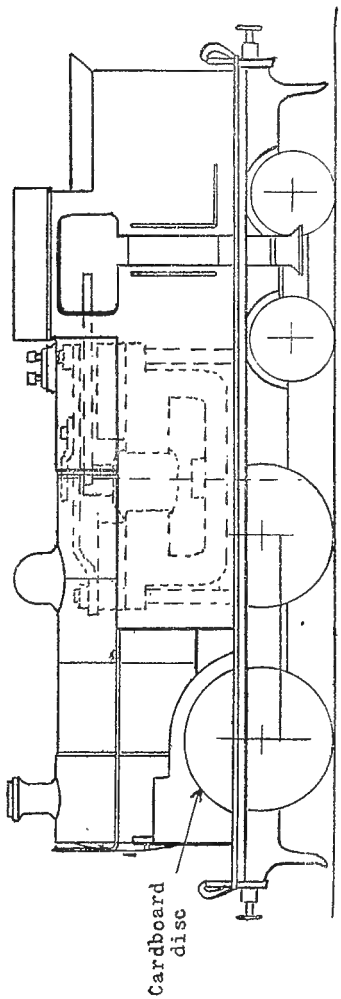


Fig. 253.—Free-lance tank engine with Bond's mechanism.

if LaNaL uncouplers are fitted to all separate coaches, these may be close-coupled by eliminating one of the buffers on each side—a good method, which is not too obtrusive. But with the common coupler there must be coupler-bars and therefore four buffers. It is recommended that only one hook be used between each pair of vehicles, and in every instance the buffer-bar for the couplings must be arched outwards to give more space for the hooks. Never fit a straight wire bar on a coach.

A fine material for metal under-frames and solebars is brass rail. In all the sketches this material is shown. The method of forming these is in Fig. 247. Normally, the whole section is on one piece, bent sharply to exact size and jointed with solder in the middle of one end after buffer-holes have been drilled in the web. Common pins are then forced into the floor and the rail attached on the outside of the pins with solder, the end-pins being snipped off and filed down, the inside pair being cut off longer to take the truss-bars—this being done by inserting a piece of stripwood for a gauge. The trusses are small-sized busbar or square metal-strip, and they should be shaped in pairs. If LaNaL uncouplers are fitted, the solebars are made in two pieces for each coach as shown (Fig. 248). Buffers are, of course, soldered. Dummy accumulator boxes of $\frac{3}{8}$-in. stripwood are glued to the floor. Roof lights are glued into holes pierced along a perfectly straight line down the centre of the roof. Weather-strips are of very thin card stuck on, all surplus glue being removed.

It is often desirable to have suburban trains made up of short vehicles as in real practice, but the greatest care must be taken in the forming of the running gear, or trouble will follow through the lengthy wheelbase. The standard design for such a coach is shown in Fig. 249, but in this design it is necessary to give some lateral play to the centre wheels. It is obvious, however, that old-type suburban coaches varied considerably in length, and we are indebted to Mr. F. W. Chubb for the two excellent drawings (Fig. 249) which appeared in the *Model Railway Constructor*. Litho sides for any of the companies can be so shortened as to serve two such coaches instead of one full-length bogie coach.

Another scheme is suggested in Fig. 250. Here the method of articulation is resorted to, the short bodies being mounted on standard bogies as shown. For a suburban train, this has a quite excellent appearance and provides a traffic medium that is most flexible, compact, and realistic. Six of these short coaches can be had out of a three-coach sheet of lithos, the door and compartment arrangements being set out as appears most convenient.

A running item rarely described for modelling purposes is a complete break-down train. Such an item existed on the West Midland lines, and a sketch is included. The crane, for which a design is given in Fig. 251, was made entirely of metal. For the jib the main members were of brass rail, the under-carriage was built up much after the style of the well-wagon. The framework of the crane was

of tinplate or thin brass sheeting. A suitable cylinder may be had from Stewart-Reidpath Ltd., requiring only a little filing up to give it the correct shape. The mechanism was made from clock wheels, with a larger gear wheel between the frame and the carriage floor. On this gear the crane itself is arranged to swivel freely so that curves are readily taken by the vehicle when in service. The crane does not operate, as this seemed unnecessary. The bogies are Hambling goods bogies in brass. For the train itself the wagons required are generally standard types, lettered as suggested, and the brake van is, as in actual procedure, a discarded passenger coach of the suburban type. The whole train, with the exception of the crane, which is dark grey, is painted ED. blue, with white letters which were obtained from Leeds O-gauge $\frac{1}{8}$-in. wagon transfers, the larger letters being of a larger type of transfer. There was a special siding for this train at Laurenceton locomotive depot.

We now approach the subject of locomotive construction and design, and it must necessarily be dealt with in a very restricted manner. The majority of enthusiasts, however, will probably make it a rule to purchase their motive power ready built, or, failing that, to follow the excellent method of ordering a chassis, consisting of mechanism, footplate, buffer-beams, and buffers complete, with any splashers that are necessary already fitted. For many years this was the writer's own practice, and even now it is found to be the best course to follow in many respects. If a certain manufacturer has delivered an engine chassis, one has no trepidation in returning it at intervals for renovation and overhauling. A satisfactory job is, moreover, guaranteed from the start. The cost of such a chassis is somewhere in the region of half the cost of a finished engine. The construction of a locomotive carcase is a very straightforward job, and the builder of the chassis will usually be glad to do the painting, lining, and lettering if desired.

For those who prefer to buy completed engines, there is a fine range of selection. Messrs. Bond's, Reidpath, Hamblings, Tyldesley & Holbrook, Holtzapffels, and G. E. Mellor, and a number of other craftsmen undertake such work, and a group of photos give examples of their work, a selection having been made of all types and qualities in both standards. For those who prefer to start themselves to build from the mechanism upwards, there are several splendid standard ones on the market from which to choose. The Bond mechanism is good, very silent in operation, and has powerful haulage qualities. The "Reidmere" mechanism, in the new form in which it is shortly to be produced, promises to be marvellous value and offers an entirely dazzling range of variation so far as wheel-distances and arrangements are concerned. It may be had either 4-, 6-, 8-, or 10-coupled, and fitted with widely differing gearing ratios to make it suitable for passenger or freight work and to suit the speed to the wheel dimensions. It has a unique advantage which is very real in the fact that on switching out the current,

the mechanism has enough freedom and torque to continue running for a space, thus abolishing that most unrealistic sudden halt so common hitherto.

A locomotive innovation by Stewart-Reidpath Ltd. was an OO-gauge solid-cast engine of the free-lance 0-6-0 tank type. This locomotive (Fig. 270) is a distinct novelty in that the whole of the body is a die-casting, resulting in exceptionally clean lines, clean details, no weak joints, and, last but not least, decent weight for adhesion. The body-casting is complete, including boiler, tanks, cab, bunker, footplate, and buffer-beams, and the only work necessary to complete the superstructure is the fitting of the chimney, dome, safety-valve, and buffers. A standard

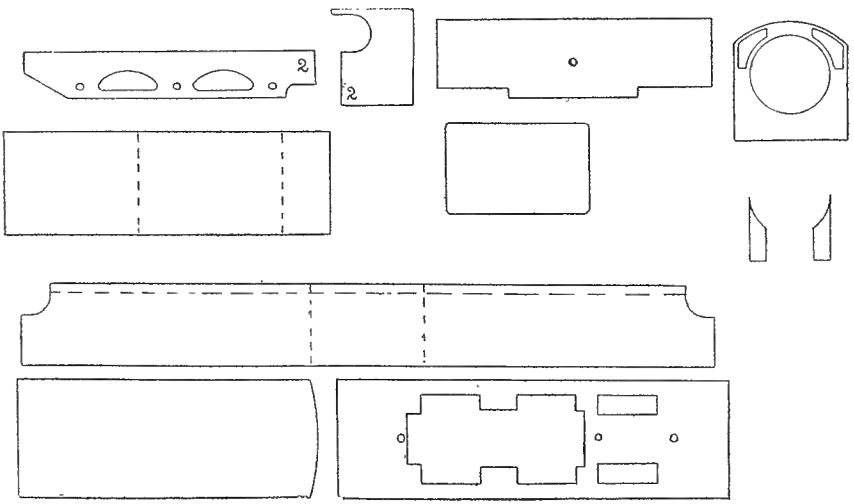


Fig. 254.

"Reidmere" mechanism, fitted with 18-mm. wheels, spaced at 28—28 mm. centres, can be fitted to this superstructure by simply inserting two screws, making a sturdy little tank locomotive of quite pleasing lines and having ample power. The body-casting can be supplied separately and in the style of several companies for those who wish to build up their own model. The price of the finished locomotive in any of the above-mentioned styles was only one-half the price of former standard types.

For those who wish to purchase the casting only, in order to make either a more fully detailed model or one having a slightly different appearance, it may be of interest to state that the casting can be quite easily cut with a sharp chisel or knife, and soldering can be undertaken provided high-quality tinman's solder is used with a clean, hot iron, and with both the parts to be soldered scraped perfectly clean. For those who wish to drill other holes, this can be done quite safely,

provided the drill is withdrawn frequently, kept clear of chippings, and is lubricated with a little turpentine.

Two or three designs are given for free-lance types. The first (Fig. 252) is a simple but popular 0-6-0 tender goods engine in which the " Reidmere " mechanism is used. In Fig. 254 there is also given a complete scaled chart of every part required for the building of this engine. The second design is for a free-lance 0-4-4 tank engine using a Bond mechanism. The smoke-box, splashers, and boiler front are also cast for this engine in one integral piece, and may be had from the manufacturers. The mechanism has the main frames running the full length of the engine and a bogie is fitted in place. A further design, suitable for more advanced workers to experiment upon, is that of a Garratt articulated 2-6-0 + 0-6-2 engine, (Fig. 255), with dual power, using a pair of " Reidmere " mechanisms. Should the prospective builder desire to have the two chassis built to order, along with the middle section of the footplate complete, he will find that this firm will make a charge that is purely compatible with the amount of labour that must go into the structure, and the completion of the engine will prove a most interesting task. Banking of trains is quite impossible in these smaller gauges, the wagon-stock being too light to stand pushing that is not exactlyidentical in force with the pulling. The train will repeatedly collapse in the middle. But with a pair of motors coupled in this manner, all these troubles should vanish and really lengthy trains, consisting of thirty to forty-five wagons, ought to be managed. The motors must be kept in tune together, and take their current pick-up simultaneously from the same source.

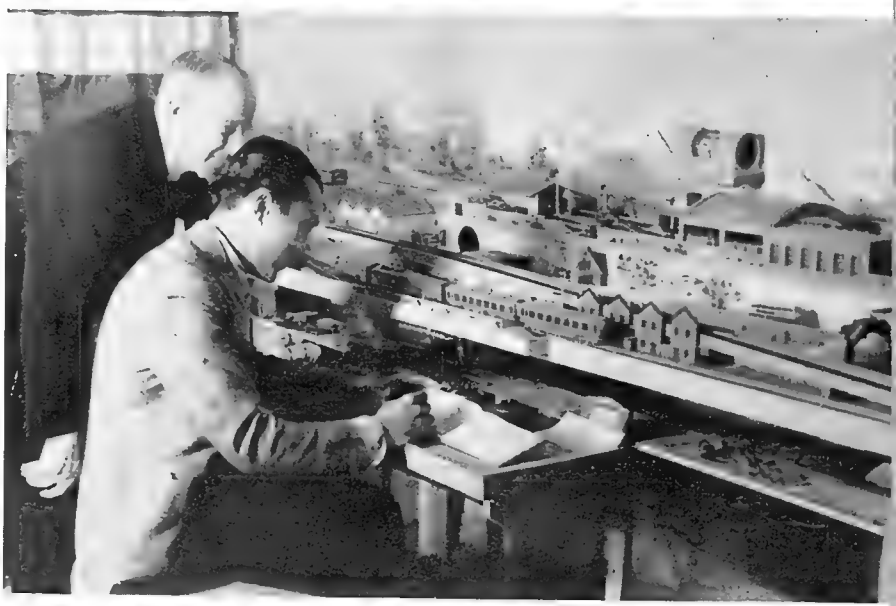
The superstructure, therefore, should be so built as to be very readily detachable—at any rate, those parts which serve directly to cover the motors—in order that adjustment and inspection may instantly be carried out.

In Fig. 256 I have arranged a display of standard parts for engine construction, as furnished by the manufacturers. The six items at the top are by Bond's o' Euston Road, the remainder being by Stewart-Reidpath. These firms, as well as a number of others, also produce an admirable range of all types of boiler mountings (funnels, domes, safety-valves) in solid brass with properly bolted attachments. The drawing of the former standard coach-motor mechanism may also prove useful. The small components are obtainable for a negligible price each item, and they are excellent in every way for their purpose.

A number of interesting and useful suggestions for actual constructional work may now be given. A good hint for the soldering of the tip of a connecting-rod pin is that a paper washer be inserted to avoid soldering the rod at the same time, this paper afterwards being torn away. It will act also as a gauge and give the necessary freedom, and no more, to the engine running gear. Next we have a suggestion for getting the first item of the super-footplate work at right angles, the plate being rested on a piece of plywood and a block of square stripwood being

A general view.

His Royal Highness and Mr. W. J. Bassett-Lowke arrange a timetable.

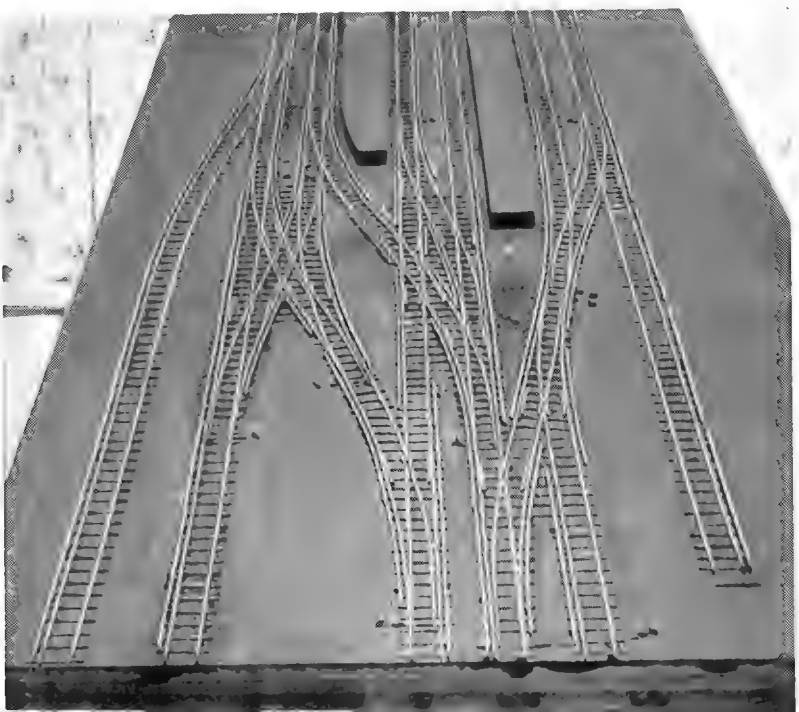


Prince Birabongse's Trix layout.

An interesting residential area.

Above : Locomotive yard on the Old West Midland.

Below : Part of the Harrow Railway Group's layout, showing check-rails of correct shortness and proper spacing of third rail.



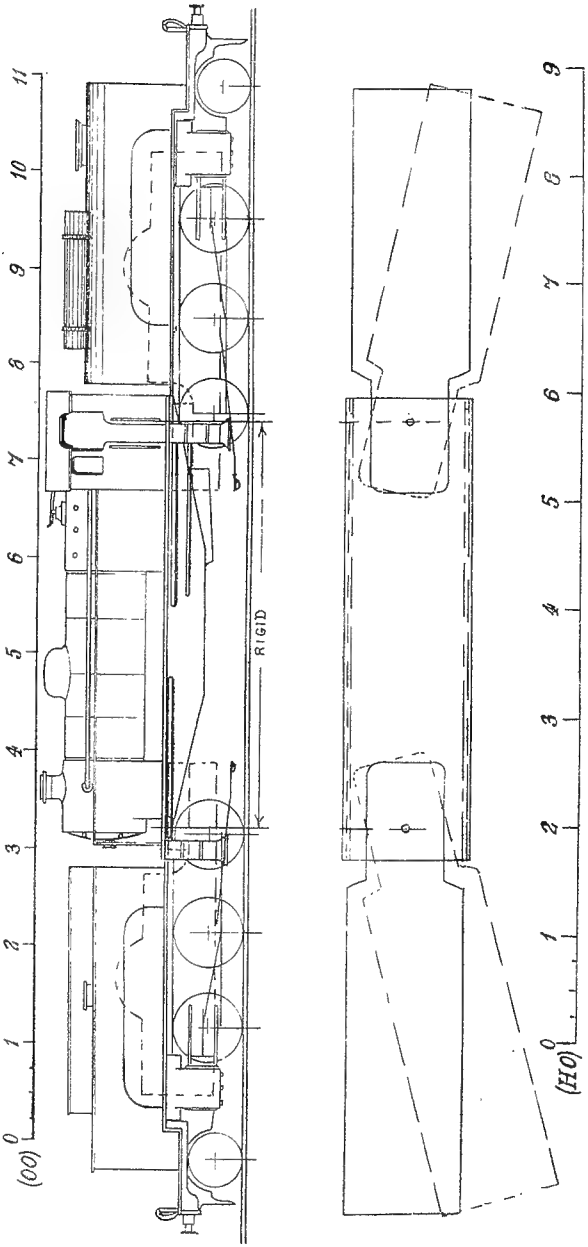


Fig. 255.

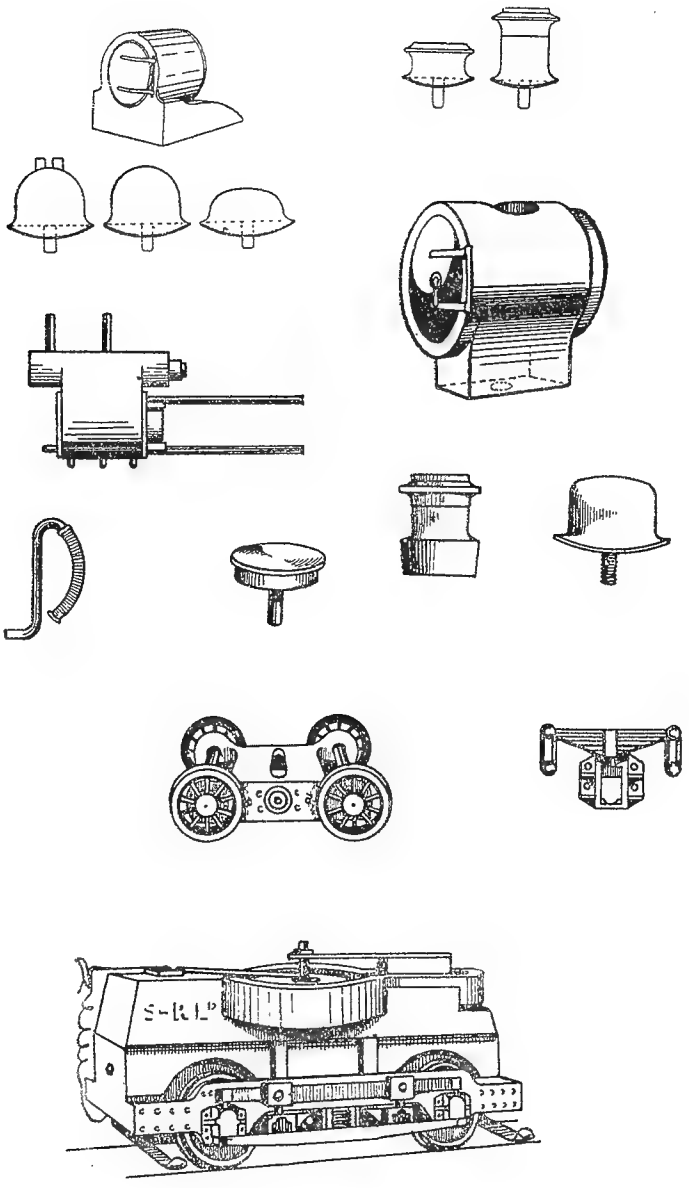


Fig. 256.—New " Reidmere " coach unit.

used as a guide (Fig. 257). Fig. 258 shows how boiler-bands consisting of fine wire are soldered in place tightly, underneath the boiler, the ends being then cut off. For cutting out a footplate cavity to take a mechanism we have the method of Fig. 259. A series of small holes are drilled in the sheeting just inside the cutting line and the intervening portions sawn out, the whole being trimmed to dimensions

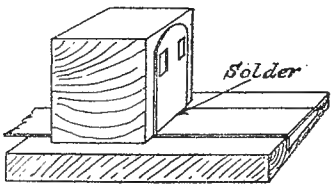
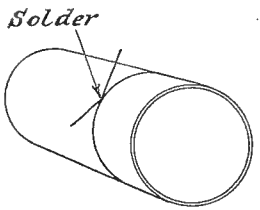


Fig. 257.



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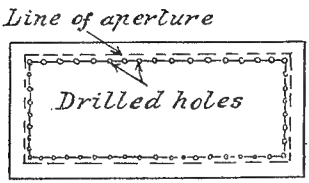

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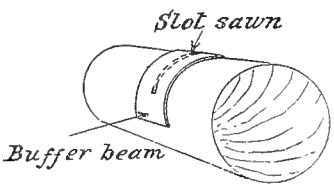

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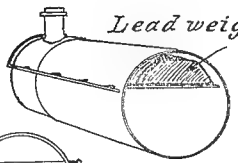

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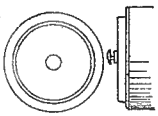

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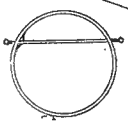

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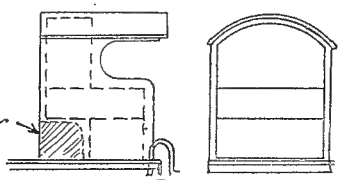

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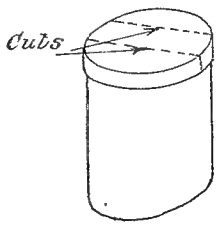

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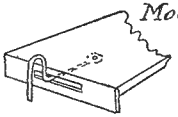

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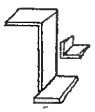

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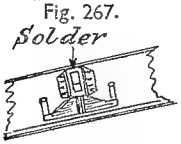


Fig. 268.

with a large, fine file. To cut a slot in a buffer-beam, do this before the beam is actually itself cut, bending a piece of sheeting over a boomshaft and sawing crosswise, then, after trimming with a file, cut out your beam. Fig. 261 shows a method of fitting handrail knobs on pins running right through a boiler, these being soldered inside at one end to retain them, the rail being then soldered to the pins, which are first cut off evenly, using a piece of $\frac{1}{16}$-in. stripwood as a gauge. The rail, a length of fine german-silver wire, is soldered on while the edge of the stripwood is used as a level rest under the pin-ends. In Fig. 262 is an idea for fitting a heavy adhesive weight—every engine should have as much lead in it as can be got in—this piece resting above the cross-pins where a low mechanism is used. An old-type solid loco. wheel may be used for a boiler front (Fig. 263), or brass buttons as sold for blazers are good. The best way of making splashers—a

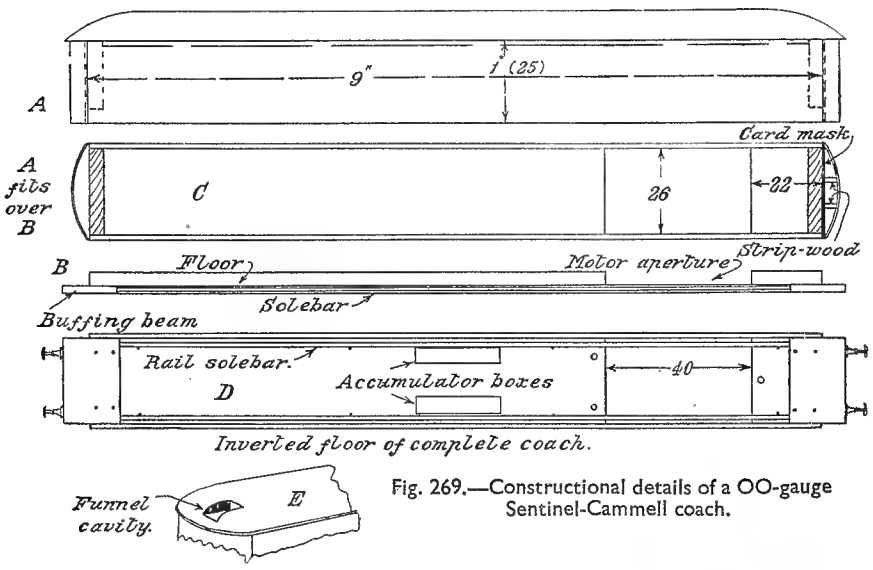


Fig. 269.—Constructional details of a OO-gauge Sentinel-Cammell coach.

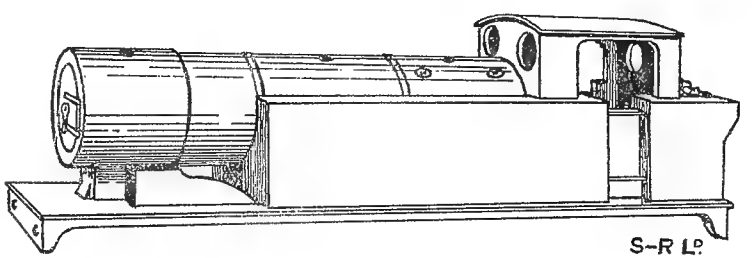


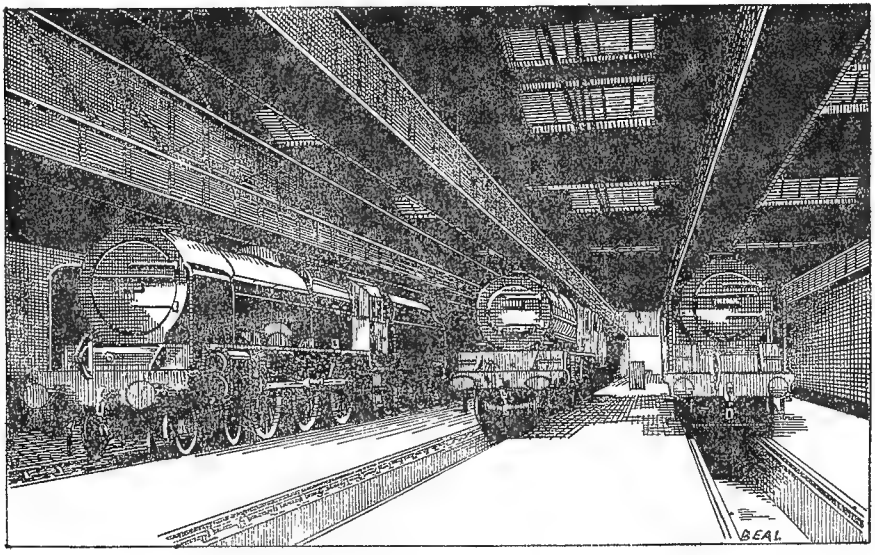
Fig. 270.—Cast-metal loco. carcase by Stewart-Reidpath Ltd.

very tricky job as a rule—is by saving up small, plain, tin lids and by cutting these on the end of a round block of wood (Fig. 264). One tin serves for the four—the lid for two, the base for two. In Fig. 265 is given the simplest method of forming a coupler between tender and locomotive; in Fig. 266, the way to make steps; in Fig. 268, how to fix on tender axle-guards. The guard is stuck on with glue, keeping the liquid out of the journal, and then the lower edge is soldered to the tender-frame. To get as much weight as possible into a cab, follow the method of Fig. 267. Shaped lead blocks are soldered together, slipped in loosely after painting black, and the tender-hook retains the weight in place. Another method is to line the roof and sides of the cab with lead, but the former method allows more weight, which is vital.

A good model may be made from the litho sides for the Sentinel-Cammell coach, and such models may be run in duplicate, since there are four numbers and titles to select from. Wooden shaped roofs are available, and since the advent of the "Reidmere" motor it is possible to have a selection of mechanisms for such a vehicle. The standard motor for these coaches is a new motor-coach bogie, which will incorporate most of the "Reidmere" mechanism parts. As regards the bogie itself, this has been designed on the lines of those in use on the Southern Railway Company's main-line electric motor coaches, the bogie side-frame castings being models of the equaliser-bar type, and are even complete with a dummy collector bar suspended from the axle-boxes, as in the prototype. Actually, current collection is by means of a collector. The mechanism is shown in Fig. 256.

In fitting the standard coach mechanism, the way to proceed is to build up the floor of the coach directly on to the motor plate, by screwing it to two pieces of plywood, one $6\frac{3}{8}$ in. by 26 mm., the other $\frac{7}{8}$ in. by 26 mm. These pieces are held rigid by the motor itself and by the rail solebars which pass along the whole of the underside, as shown in the sketch D of Fig. 269. The body and roof are in one piece (A), the sides consisting simply of strips of glass 9 in. long by 1 in. wide, as thin as possible. There is a cardboard soffit under the roof to fit inside the glass, the ends of the glass being bound in parcel-strip to the ends: the latter should clear the floor and yet rest on it. Paint black the inside of the ends which faces up to the glass windows. Two pieces of bent celluloid are then attached with strip to the sides to form the shaped ends, and these are retained in their bow by means of a short piece of stripwood glued upright inside. A small recess is cut in the roof to receive the funnel, which is a "Merco" component. For the buffer-beams, use two pieces of fretwood of the same thickness as the solebar, and let them project about $\frac{1}{4}$ in. beyond the ends. Oval buffers are fitted. The dummy accumulator boxes serve to conceal the collector wires, which are shaped by coiling them around a thin pencil, in order to give extreme flexibility to the bogies. These lithos may also be had without lettering.

Part of the operation of a railway will inevitably consist in the oiling and adjustment of mechanisms. Oiling should never be too lavish but should always be adequate. A medium-heavy oil should be used for motor spindles and a lighter oil for running gear, and this should be applied on a wire or through a Meccano oil-can. Never lubricate a commutator surface unless with a very slight touch of pure vaseline. It is a necessary thing periodically to slip out the armature from a permanent-magnet motor and to immerse the remaining gear, with the whole chassis, in a bath of paraffin. This effectively washes out the bearings and is harmless to the metal, and although it may wash off a light black paint from the wheels, this can easily be re-applied. Every engine should have two bar collectors, which must be fitted in such a manner as to be in no danger of fouling connecting rods or steps or other projections. The test of a good collector is whether you can lift one side without in any way affecting the other side by the movement. Adjustment of collectors is a very minute task in which everything may depend upon $\frac{1}{32}$ in. But with a little care they can be adjusted so as never to get out of place. Motor brushes should always bear symmetrically upon the commutator at every point, and should be level, each one having a robust springing movement, falling on the commutator with a snap. The knack of giving the springs the requisite bend only comes after long practice.



CHAPTER VI

COMPLETING THE SCENIC PICTURE

WHEN modelling in the smallest standards, the subject of scenery has an importance of its own. If the " bird's eye " effect is to be maintained, there must be careful attention to this detail, such as is given to other features of the layout. An additional emphasis, perhaps, requires to be laid on it simply because the scenic touch is so rarely cultivated. " Silly scenery," or anything un-railwaylike, will immediately destroy an otherwise convincing and effective piece of work. Few designers of layouts ever think, for instance, of allowing themselves to be influenced from the beginning of their scheme by any consideration of scenery. They plan a railway and add the scenic effects afterwards. The ideal way more closely approaches the very reverse of this method. Track should be arranged to fit the scenic picture, if this is possible, though, of course, there will be emergencies arising from planning and construction which will suggest some useful course to be followed. Consistency is an important factor. Behind a terminus of considerable size there should be city views ; a dock will require shipping, coaling appliances, sheds ; a country halt will take a golf course or aerodrome ; a model stream or river will require to be followed up in the background by a waterway approach, and so will an incoming road. It is often possible, indeed, to create the whole of a roadway approach to a station or freight depot in the background view, and this expedient may frequently be made to conserve space. It is a good practice to have in mind some definite section of favourite landscape and to try to reproduce this. Even a straight length of permanent-way can be made fascinating by completing the picture of it—adding correct telegraph poles, signals, painted embankments, a platelayers' hut, or even a shunter's henhouse ! A model of a railway should at least look its part.

In order to achieve this, it is not necessary to arrange the main lines and branches of the railway to take all manner of fantastic twists and curvatures, nor to keep bringing the high level over the low level to form bridges. Few items will look more attractive than a long run of quadruple level track properly finished off, and nothing is more satisfying when running trains than such a straight section, simply because it is intrinsically railwaylike. Nor is good scenic work necessarily a conglomeration of wooden detail. One word of warning in the use of brick-papers is that when a building is finished in plain new red brick it may need to be given dirty and smoky patches, a few, but not too many, advertisements. Scenic art, again, is not to be confused with prettiness—an ugly advert. hoarding may be a work of scenic art. A train disappearing into a veritable forest of trees—a feature often seen in real life—is rarely a modelled feature ; but it might very easily be.

In forming backgrounds, most of the acknowledged methods have their defects. Wallpaper friezes are generally hopeless for the purpose ; their colourings are too greatly predominated by a definite shade, and they cannot therefore be made even in short sections, to blend with more robust settings. Perhaps if railway posters were displayed in artists' shop-windows at a guinea each they would sell rapidly for railway modellers' use, but just because they are railway posters, displayed for commercial purposes, many begrudge payment even of a reasonable fee. The railway companies were, prior to the war, really very obliging in their attitude to enthusiasts, and it was often possible to claim a 50 per cent. deduction allowed when these posters were for educational uses. This meant that for a half-crown the whole side wall of a layout could be correctly finished off, for a poster may often be employed to cover more than its own poster-width : and in the use of them one has the very definite advantage of using the work of first-rate artists and experts, and it is not necessary to be afraid of mutilating the material for different sites.

The enthusiast should make it part of his aim to secure a gradual collection of all manner of coloured pictures—rows of shops, villas, ships, trains, factories, and landscapes. He should especially look out for odd doors and windows to scale, which can often be taken from cartons containing commercial products, and so forth. Home magazines abound with coloured views of houses and gardens. Lettered sign-boards, name-titles in white letters on colours or black, groups of trees, street vehicles, etc., so long as they are in life-colours and to scale or smaller, should be culled and put away.

The actual wall of a room should be either distempered at the next spring-cleaning a light sky-blue, or else a frieze of " sky-paper "—a deep frieze consisting of nothing but blue sky and downy clouds—should be attached to the wall the full round of the room. If it is not possible to affix to the wall, form a border of plywood and stick the sky-paper on that. This method has the advantage of rendering the background portable and interchangeable. Keep a weather-eye open on all railway stations for titles of satisfactory posters, the larger the better, make a note of these, and order at first opportunity. The posters are then attached to the background boards by cutting out the entire upper skyline, generally along the roofs of buildings or the ridges of hills. If the subject is shipping, and the cutting would be out of the question, it is often possible to " take in " a mass of cloud, or to cut off a few black details like rigging and trestle-work, and later copy this on to the sky-paper in carbon pencil. It is not necessary that one poster should make a perfect scenic blending with the next. Leave a slight gap, which may be filled up later with a tunnel, a large building, or, best of all, by a special piece painted by an artist friend. Failing the latter, find a belt of trees from another poster and lay this over. A picture may be cut longitudinally sometimes, and may thus form a double length

of background. This was done behind Glamis Station (W.M.R.), as shown in the photos, when the poster " Kendal and Oxenholme " was thus treated. In Fig. 271 a method of joining two pictures by means of a tunnel is shown. Occasionally a large human figure in the foreground, which would in the ordinary course ruin a poster, can be covered perfectly by a painted tree. It is very easy to simulate factory buildings in plain brown paper, with shading under the gutters and eaves consisting of strips of painted parcel-strip. These should not be executed in elevation merely, but in perspective. Building papers may be judiciously used on small buildings, and " Merco " sash-paper was really intended for this purpose ; it avoids the difficulty of drawing white ink-lines. The main thing is to give plenty of time to the experimental setting up of the posters with drawing-pins before

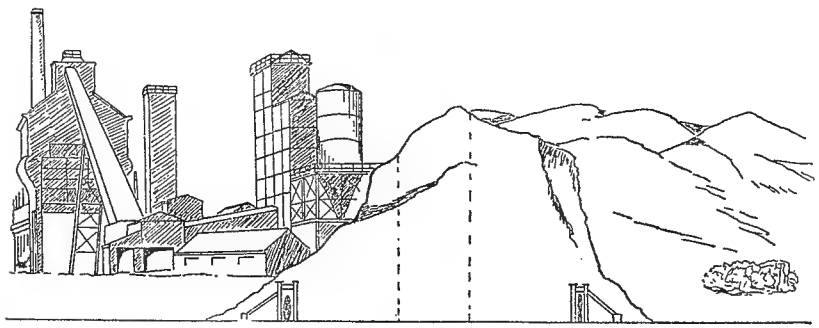


Fig. 271.—Tunnel section joining posters.

settling on the final scheme. This is worth as much time as building track and engines Do not conclude that you have found the best arrangement until you are absolutely satisfied and certain. A number of photos will give some impression of how to carry out this work.

Wagon papers are not only adapted for use as such, but may do fine service in a scenic capacity. In Fig. 272 I give a sketch which suggests a factory background to be executed in smoky brick-paper with parcel wrapping paper for the roofs and strip for the shadings. The trestle-work is sketched in with carbon pencil, and where the facing walls are in recess, plain dark paper may be used rather than brick-paper of the same scale as the foreground. The row of wagons is set behind an outstanding retaining wall, about $\frac{1}{2}$ in. from the wall. This train is so arranged that all the running gear would be covered by the retaining wall ; but when this is impossible, a little careful drawing with a carbon pencil can provide all the wheels and axle-boxes as well as the end-shading of the wagons, the roofs of which are done in plain white paper. A scene like this can be worked up on a flat bench before setting in place. It is often possible to find in an old *Railway Magazine*

a scale coloured picture of a locomotive in perfect profile, and this may also be included. Another sketch (Fig. 273) gives the idea of how to carry out this work. It is very easy work to make cardboard flats of villas in perspective, using building papers.

For the actual modelling of roads, fields, rivers, and ponds, or trimmed lawns, there are good expedients. A macadamised road is easily copied by gluing the surface required and sprinkling with emery powder. Station platforms may be glued

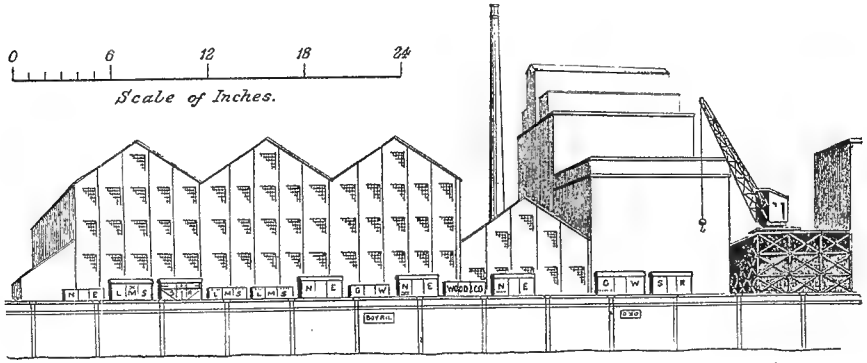


Fig. 272.—Background sketch, showing use of wagon papers for scenic work.

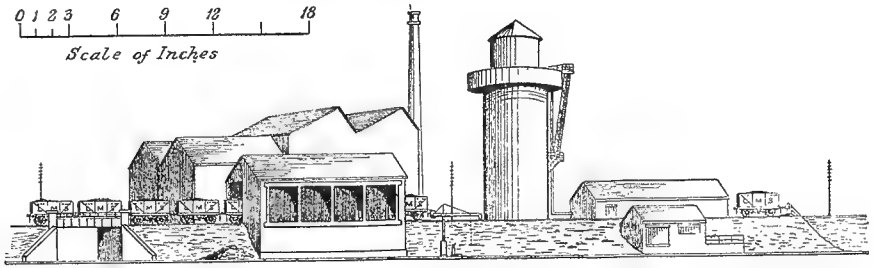


Fig. 273.—Sketch incorporating scenic wagons with running gear drawn in carbon pencil.

and sprinkled with cement, or with emery powder on a black-painted surface. "White" roads are sprinkled with granite dust from a quarry. The best adhesive for coating the surface of roofing felt to make a road is Durofix which will not shell off later as Certofix and Seccotine will. Fields are best simulated by means of medical lint, dyed almond-green in Fairy Dye, and glued down. For this purpose Certofix is best. A trimmed lawn around a house is represented ideally by using green flock wallpaper, this being darker. Green Flox power, sprinkled on adhesive, is just as suitable. It is obtainable from G. N. Slater.

Trees are a difficult problem and are rarely seen truly reproduced. The best method in making small trees is to use heather. If a winter effect alone is necessary, the heather is simply stripped of all its foliage and well-shaped pieces set in holes in the baseboard closely together or in rows. If foliage is required, the stripped twigs should be dipped in a medium solution of Certofix and warm water and immediately sprinkled (with great care) with green-dyed sawdust, obtainable in

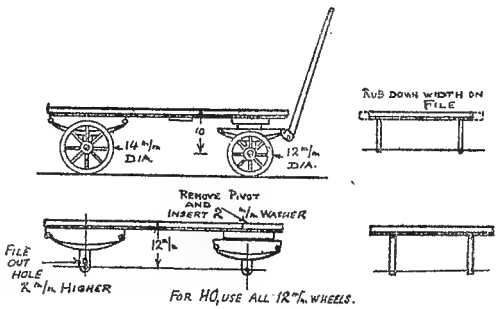


Fig. 274.

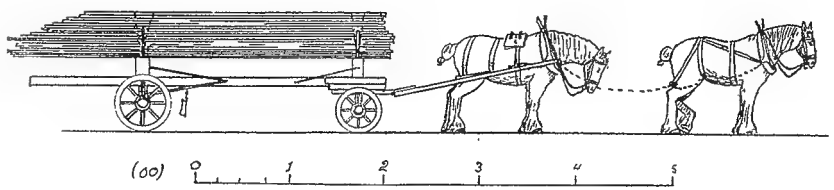


Fig. 275.

sacks from the model manufacturers. This is good material and serves exceedingly well for sticking along the ground edges about buildings, on the sides of embankments and cuttings, and so on. Trees should sometimes be modelled to form a dense wood, in small sections. But they look very well when sparsely used also, and especially in set rows along a highway. Never use an inferior commercial model of a tree.

A good model of a street looks well, and may be furnished with rows of shops, standard villas in housing schemes, and such like. For modelling shopfronts, watch coloured adverts. of household commodities for window displays. Tiny transparencies in cellophane, printed, can be had around certain toffees, and these look well stuck on glass. In modelling a housing scheme, or part of one, do not set all the villas on the same level, but first form an undulating base of medical lint, setting blocks of odd floorboard for the foundation of each building. A good little wire fence is sold as a " Skybird " component, and this should have the top

row of rail cut off, the tinplate base being covered with modelling material when in place. " Merco " old stone-paper is excellent for a model church, and a picture is given of such a model.

Certain human and animal figures are necessary for a layout if it is not to have a desolate appearance and if good and effective photos are to be taken. A miniature hunting set, obtainable as recently as 1939, will produce several huntsmen and some very good horse models for lighter uses. A heavy horse could be had from Woolworth's. It was made by Kews Ltd., Endwell Works, Brockley, London, S.E.4, and was, of course, not an accurate model such as one would desire, but it was very readily altered. The head should be removed and set on at a better angle with a slightly shorter neck, the tail should be filed off and substituted in plastic wood

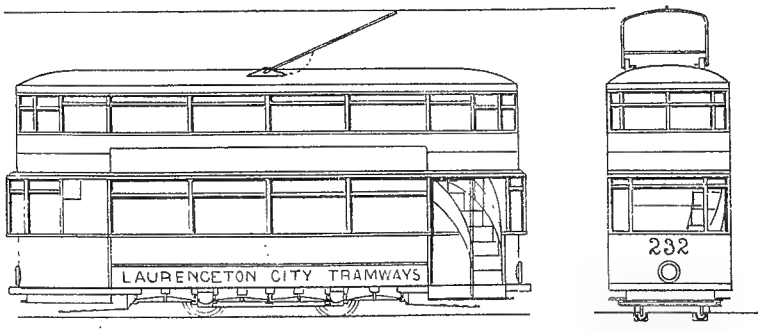


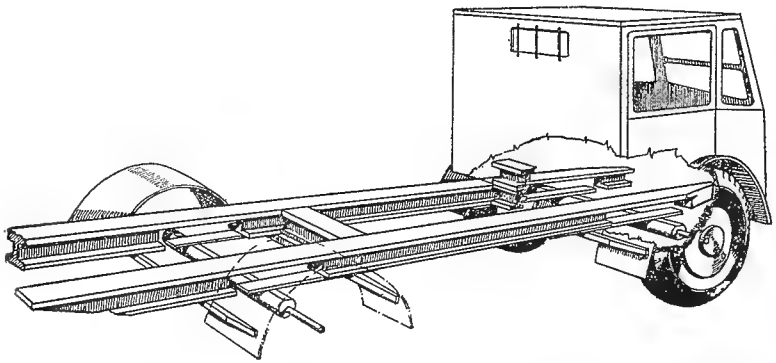
Fig. 276.

by a short, plaited tail as for a cart-horse. The feet may be slightly filed underneath to decrease the height of the model by about $\frac{1}{16}$-in. Then it should be painted to any flat colour required. Harness is done in wire and black parcel-strip, ship's chain serving for certain details. Something after the manner of Fig. 275 will then be the result. Plastic wood is good for this purpose. Attachments for shafts may be made by drilling a hole through the body and inserting a length of wire with loops. But do not attempt this work unless you intend to exercise precision even in the matter of harness, which in the sketch is correct.

Hunting figures are sold by Messrs. Mansell, Hunt, Catty & Co. Ltd., of Cressy Road, Hampstead, London. A very excellent little range of pedestrian figures for use with both gauges was introduced by Hambling & Co., Trix, and Hornby. These include passengers, railway officials and artisans.

Lastly, there will be a need of road motor models and other wheeled traffic. An empty horse-lorry with raised shafts gives a new atmosphere to a factory or goods yard. Such a model can easily be made of tinplate and wire, a snap-fastener from a carpet holder being used for the swivel or fifth wheel. The wheels are best

made from wagon wheels—on an OO model use tender wheels for the rear pair and wagon wheels for the front. For HO use the same HO wheels : but in ordering these, have the flanges turned off, and the result is all that could be wished. The drawing of a scale lorry is given in an earlier section of this book along with that of the L.M.S. carriage wagon. It is possible, however, to adapt a Dinky-Toys motor trailer, with only slight modifications, to form an excellent horse-lorry. This is done in the manner of Fig. 274. The wheels are removed from the trailer and its sides rubbed down on a file to the scale width of body. The wheel holes for the axles are then filed upwards to decrease the height of the vehicle, if necessary a 2-mm. washer being inserted at the front to level up the body. The metal wheels are then added, being flush with the axles on the outside. A pair of shaped shafts



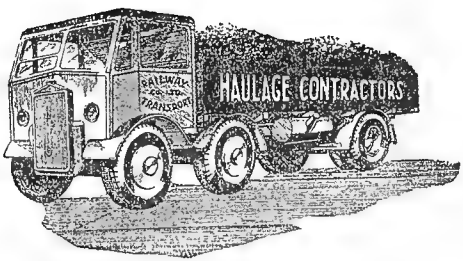
Some constructional details of a Wilson lorry.

are all that is now necessary. A set of " timber wheels " can be easily modelled after the style of the horse-lorry, as in Fig. 275. A length of $\frac{1}{8}$-in. wire forms the main member.

Motor omnibuses are made from fretwood for the floors and roofs, and celluloid of a good thickness for the sides. The roof is shaped from wood as for a coach ; a piece of coach roofing will serve the purpose. The finish of the body is carried out in blue or green enamelled parcel-strip, cut out after painting, the window sashes being done in smooth cream or ivory white *passe-partout* strip. The Dinky Toys omnibus, however, is a very fine little model and easy to convert. The base is readily removable, so that celluloid windows can conveniently be fitted. A good scheme is to shape one large piece of celluloid for the whole of the windows on both sides and front and rear, wedging it in place with card soffits.

A coach motor can be fitted into the tramcar in Fig. 276. A number of engine axle-guards are filed down to form the dummy spring gear, the coach

motor being made a fixture inside and the lower windows painted black on the off-side. The bodywork is the same as for the bus. By arranging an overhead trolley supply for the live wire and laying rails either of umbrella-rib set in the roofing felt or of standard track, it is possible to have one or even a pair of these vehicles permanently running along a straight track and around loops under a baseboard to enhance the appearance of a city terminus. Good headlights are made from crystal buttons having a composition casing and obtained from the useful Woolworth store. Wilson lorries are a comparatively recent innovation and are an excellent line with many varieties. Two types of motor van are in the Model-craft Series of card-models.



CHAPTER VII

A CHRONICLE OF THE WEST MIDLAND LINES

THE author's OO-gauge layout began its existence when he was a missionary in Jamaica, though in those days (1918-20) it was a purely experimental affair with a track-gauge of $\frac{3}{4}$-in. Purchasing powers were extremely restricted, nor were any accessories obtainable at that period. About four years were occupied in building a large American-type station and a few small models. Some time later (1922) a real start was made in South Africa, the builder labouring absolutely alone, though still no actual system was laid down. A large collection of separate models was created, all of which were shattered to scrap on the voyage home. Some experiments were made in model photography, the results, crude enough, appearing in *The Model Railway News* of 1925 onwards. First efforts in mechanical drawing were also made in order to break a somewhat lonely and monotonous life. Shortly after this a return was made to Britain and a settlement secured in a Scottish rural parish. It is confessed with some reluctance that for a space of three years no thoughts were given to railway modelling, there being over much fallow ground to be broken in other spheres. But one day, when casually taking up a copy of the *News* in Edinburgh, the writer was taken aback on finding several quite clamorous inquiries as to his whereabouts on the part of correspondents ; so the work began once more and has never since ceased.

It was not until a removal was made to Dundee that the first actual railway was put down and the West Midland Railway No. 1 came into being. No plan of it was ever drawn before construction or since, though several photos, made by Mr. Cecil W. Meredith, were published. This layout included the small terminus known as Wattletops, which is illustrated herewith in one of the best pictures the line has produced. The track was first executed in cut-down Table Railway rails of tinplate, but this was early abandoned in favour of some excellent busbar track with soldered sleepers, with many extremely complicated points, built through Mr. Meredith's kindness by Mr. J. L. Rea. In the picture this track is shown. Another quite well-known feature was the lime-works, so often photographed, of which fully a dozen duplicate models have been made by the writer.

At this period (1931) good track and acceptable accessories began to be produced commercially, together with the " Merco " series of building and rolling stock papers designed by the writer. It was gradually felt that something much more workmanlike must be undertaken by way of a layout ; so in 1932 the W.M.R. No. 2 was designed for a room opposite that already occupied and divided therefrom by a 9-ft. landing. This plan is herewith given (Fig. 277) and it may be said that the entire scheme was much more of a notable creation than its predecessor. Some

of its now notorious features—the flying junction (the first to be attempted in this scale) an astounding double-deck girder bridge of rail, the first model street with shops and a really ambitious terminus building with roadway entrance of a most imposing nature—these will be remembered. It was the owner's good fortune at this time to receive one day an unexpected call on the part of Mr. Ian R. Fraser, now divisional engineer of the L.M.S. at Glasgow. This gentleman, whose friendship is still cherished, astonished the owner by shortly afterwards presenting him with the famous three-span viaduct which has figured in every W.M.R. layout since, and which is a magnificent piece of engineering work. Not satisfied with this act of generosity, the visitor issued immediate orders that the double-deck bridge

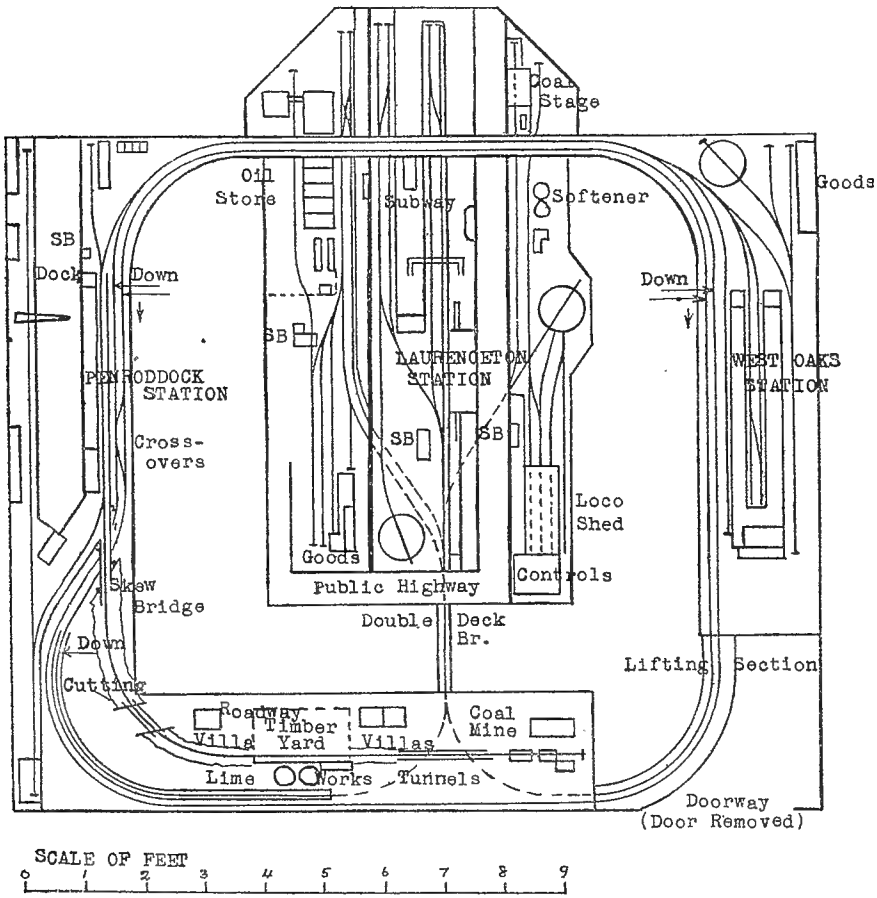
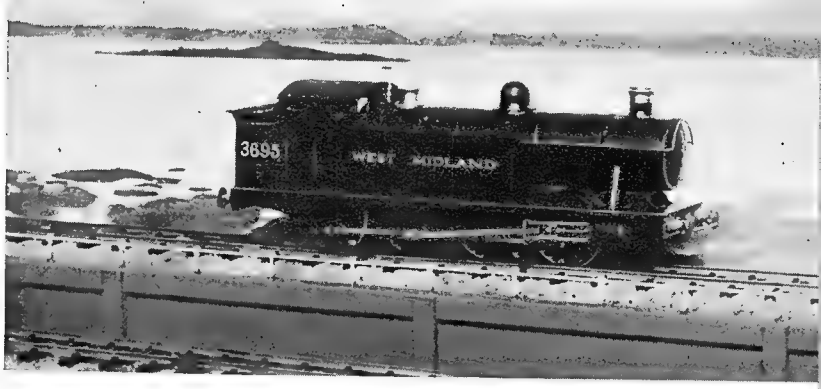
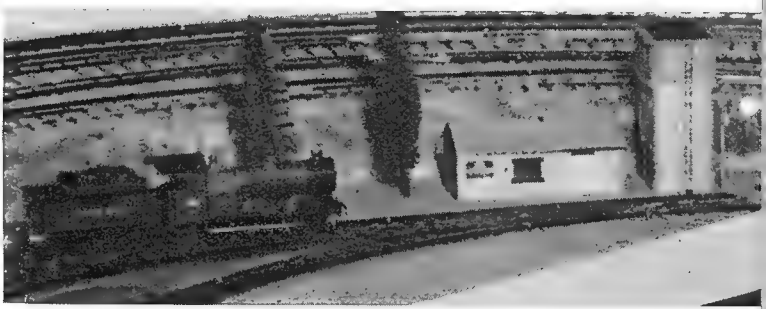


Fig. 277.—The second West Midland layout.



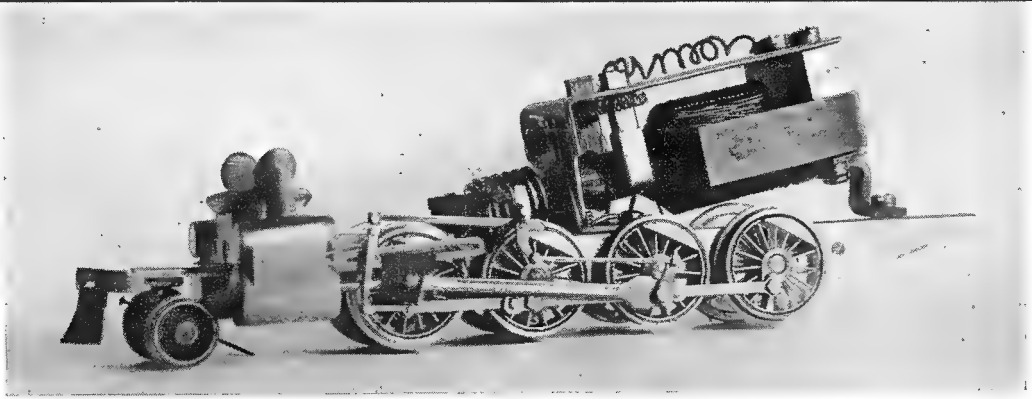
Early 0-8-0 engine by Reidpaths.

The re-built Exley 4-6-0 as she ran for some years. Tank sides were of wood, and the original cab was incorporated.



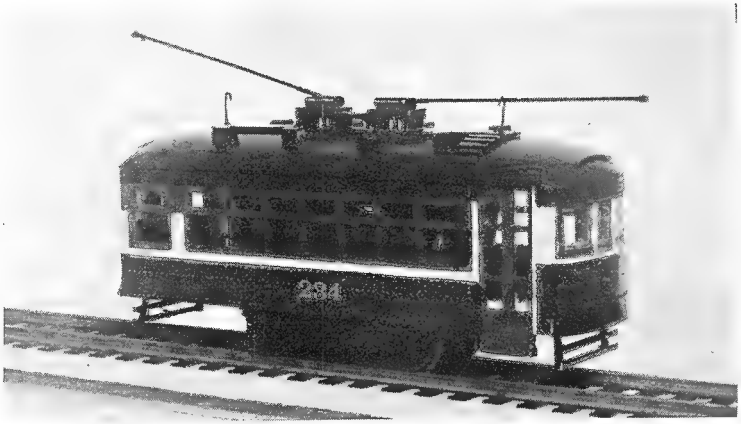
The 0-6-0 engine as she still operates. Exley tender from engine above.

Free-lance Varney Pacific " Austerity " locomotive.

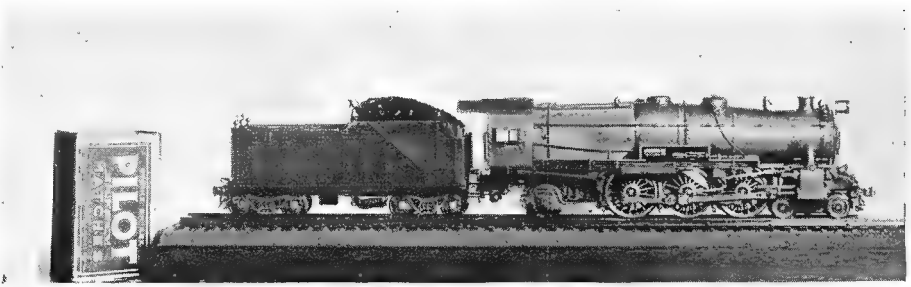


Mantua Consolidation mechanism.

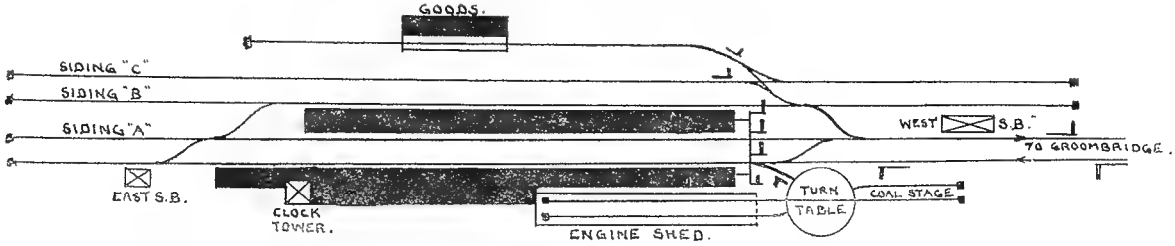
Walther's Birney street car (HO-gauge).



Walther's open-end coach in HO-gauge.



A superb model of a P.R.R. K-4 Pacific ($\frac{1}{8}$-in. Scale). By George Stock.



An interesting station layout incorporating an engine shed and turntable. This type of layout is suitable where space is restricted.

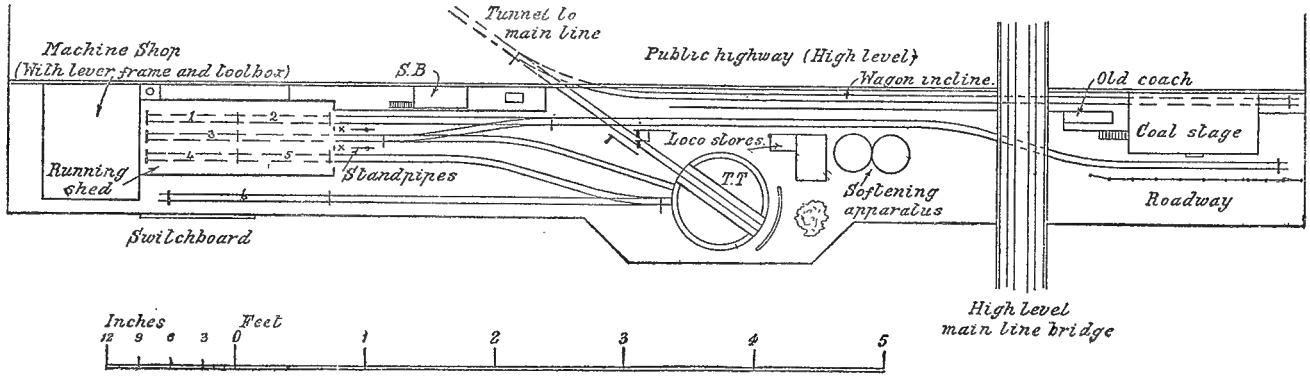


Fig. 278.—Laurenceton locomotive depot on layout No. 2.

should be instantly scrapped, as being antiquated, unreliable and generally rotten ; and it was replaced by the beautiful bascule lift-bridge which arrived by post one Christmas Day and fitted into its space like a glove on a hand.

To this period belongs the advent of the first working locomotive, which was

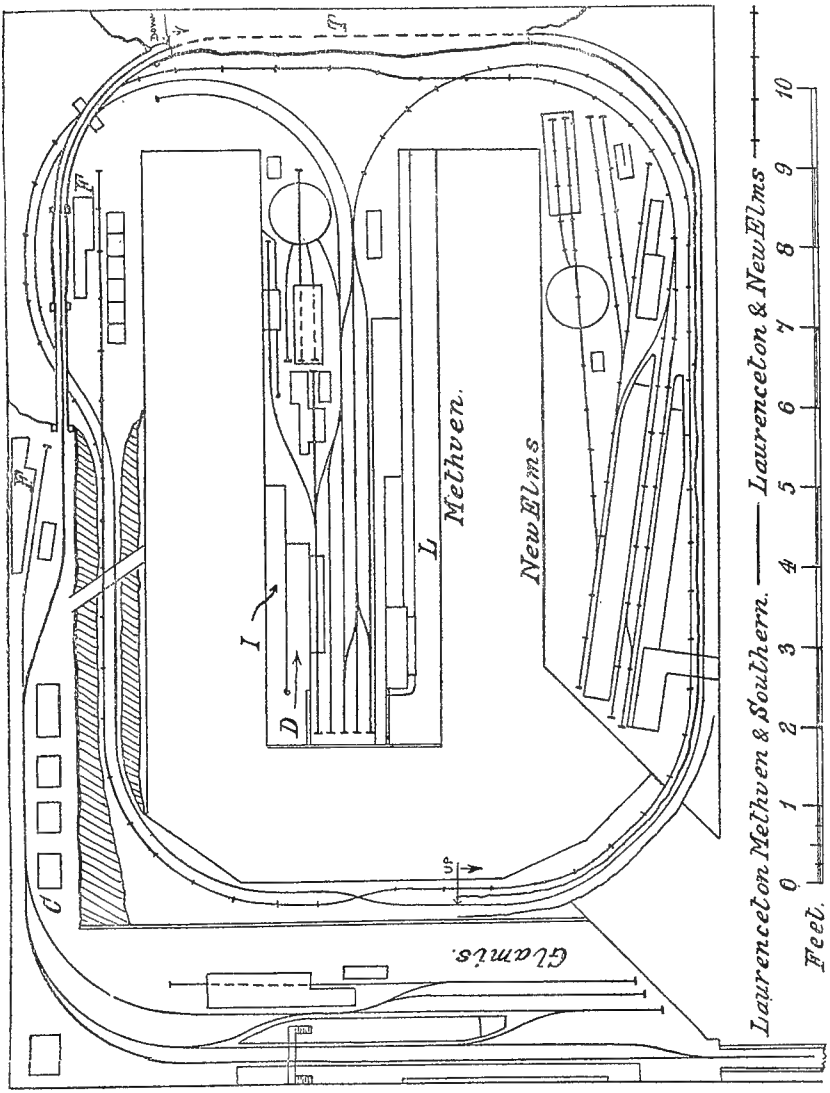


Fig. 279.—The third layout of the West Midland.

built by Edward Exley long before there were such things as commercial engines, to the order (entirely unknown to the engineering staff) of Mr. Meredith. It was a grand production for those days, though it had solid wheels and never ran on the W.M.R., for its motor was wound for 12 volts. Not until about a year later was it fitted by Mr. Reidpath with a specially built mechanism and got into service. During this time a very pretty engine of the 0-6-0 goods type was built by Mr. Bull, but its tender contained the mechanism which was geared to the tender wheels, so that it had no hauling power. The Exley engine was later rebuilt by the writer, fitted with spoked wheels, and ran for years as a 4-6-2 tank engine. Its tender later came into service and is still in use.

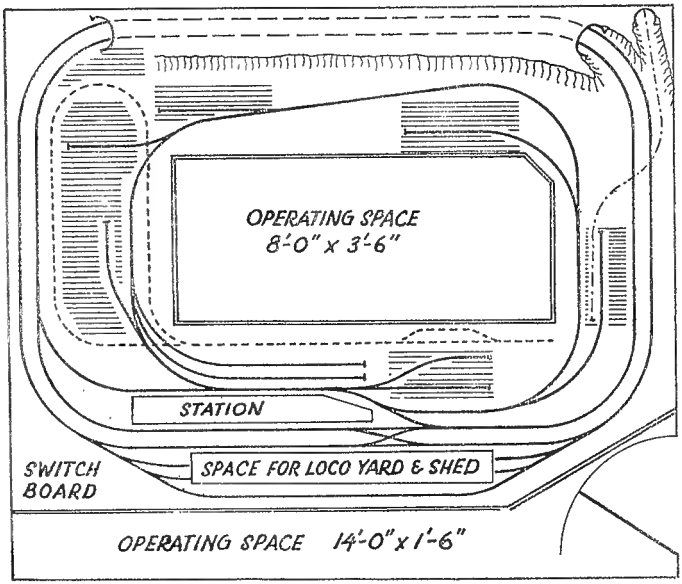


Fig. 279A. A South African enthusiast is responsible for the design of this layout. Being Gauge O makes it of particular interest, as it shows clearly the difference in size between Gauge O and Gauge OO.

Sir Eric Hutchison became a very frequent visitor at this time, and rarely appeared without a timber wagon or a private-owner's open in his vest pocket. One of my own crazes during these days, which has survived many years, was that of modelling railway features hitherto unattempted. Out of this phase there sprang the 4-mm. scale goliath crane, the semi-detached houses in process of construction, a lattice girder footbridge, numerous highway vehicles, rail motor coaches, and so forth. Among these was the two-storey goods shed with offices above which now features on the layout of Capt. Fleetwood Shawe, of Brampton. Shortly afterwards, several excellent engines were added to the stud, including a really valiant

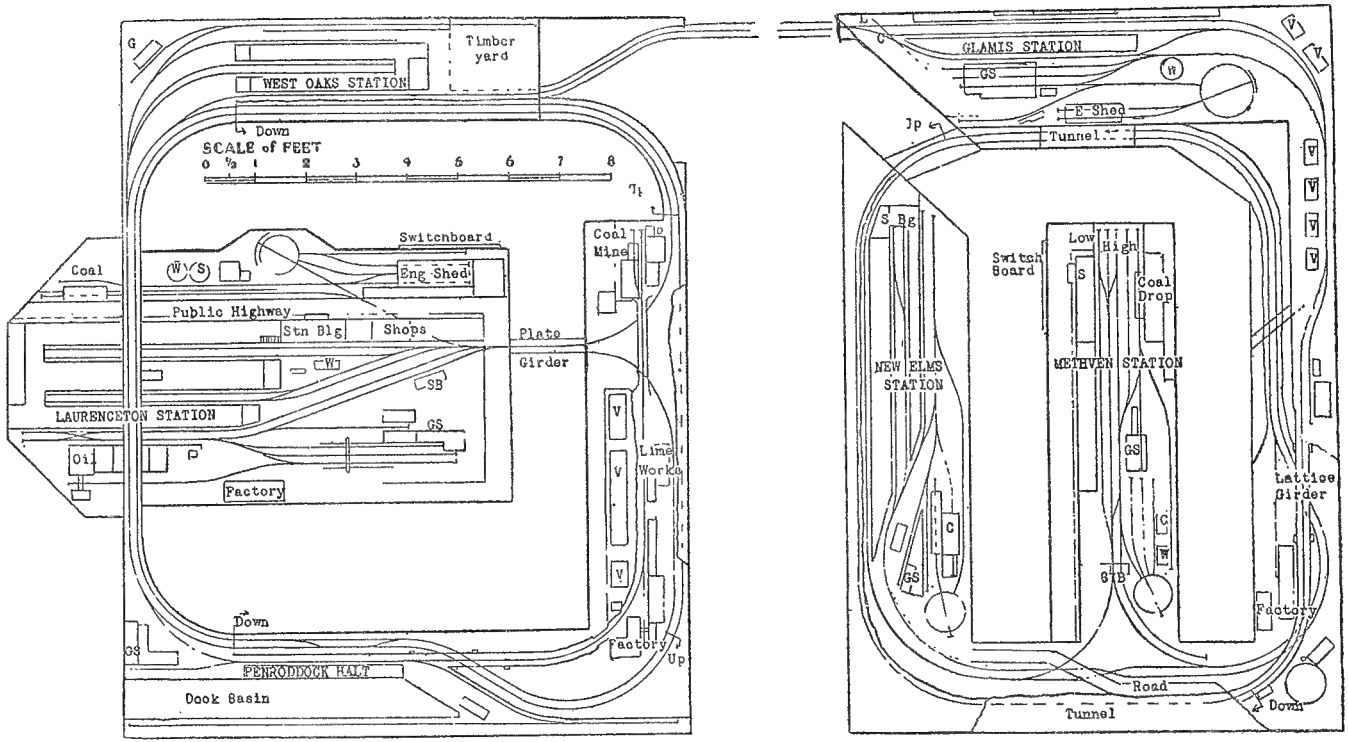


Fig. 280.—Layouts Nos. 2 and 3 as subsequently modified and linked together.

0-6-0 tender goods, with the Exley tender, whose boiler and firebox were of cardboard, and whose mechanism was specially low-geared. This engine still operates better than ever, and has undergone no major repairs in its fourteen years of life. Another was an 0-8-0 tank built exclusively by Reidpaths, which gave amazing service until it was disposed of at a period when the administration was feeling the depression!

In the year 1933, the two sons of the house were beginning to be old enough to take notice of railway modelling, and it was thought a good policy to enlarge the system by taking in the room in which Layout No. 1 had been located, and by adding a couple of small subsidiary lines to be known as the Laurenceton, Methven and Southern (L.M.S.), and the Laurenceton and New Elms (L. & N.E.) respectively. This work was duly undertaken, and its plan is shown in Fig. 279. It constituted Layout No. 3, and was linked up by a single-track batten viaduct with no pretensions at scenic beauty. On the whole, this layout was very poor, though for a long time its use was heartily enjoyed. The following word-picture published at the time may be interesting and explanatory.

"Excellent through and interchange traffic conditions will be possible. Through passenger coaches will be run from New Elms, the most southerly point on the system, by way of Methven and West Oaks to the northern city of Laurenceton, which will still remain the chief terminus and official headquarters of the grouped companies. In a similar manner, through goods traffic will be run, and there will be secondary locomotive depots both at Methven (for the L.M.S.) and at New Elms (for the N.E.). The West Midland will retain its present form and identity, not to speak of its directorate.

"The new layout comprises the three main stations, each of which will be reasonably comprehensive in size, a number of new factories, and the main lines running side by side in a double lap around the room. There is only one gradient, 20 ft. in length, giving a 1 in 96 ascent, which will scarcely be felt by climbing trains. There are to be a number of interesting engineering features, including bridges and tunnel structures. Scenic attractions will not be overlooked. One of the most interesting of these has already been completed—a 6-ft. cutting with double tracks running through it, spanned by a stone bridge leading to a housing scheme. There will also be some good hill scenery in the neighbourhood of the tunnels.

"The plan will enable the reader, if he places it side by side with that of the West Midland, to form an idea of the full scope of the system as projected. The connecting link spans a landing 9 ft. wide, and is single track, running over a viaduct, one section of which is of the hinged lifting type. A splendid model steel bow-string girder bridge, the work of Mr. Ian R. Frazer, will occupy a prominent position in the new layout.

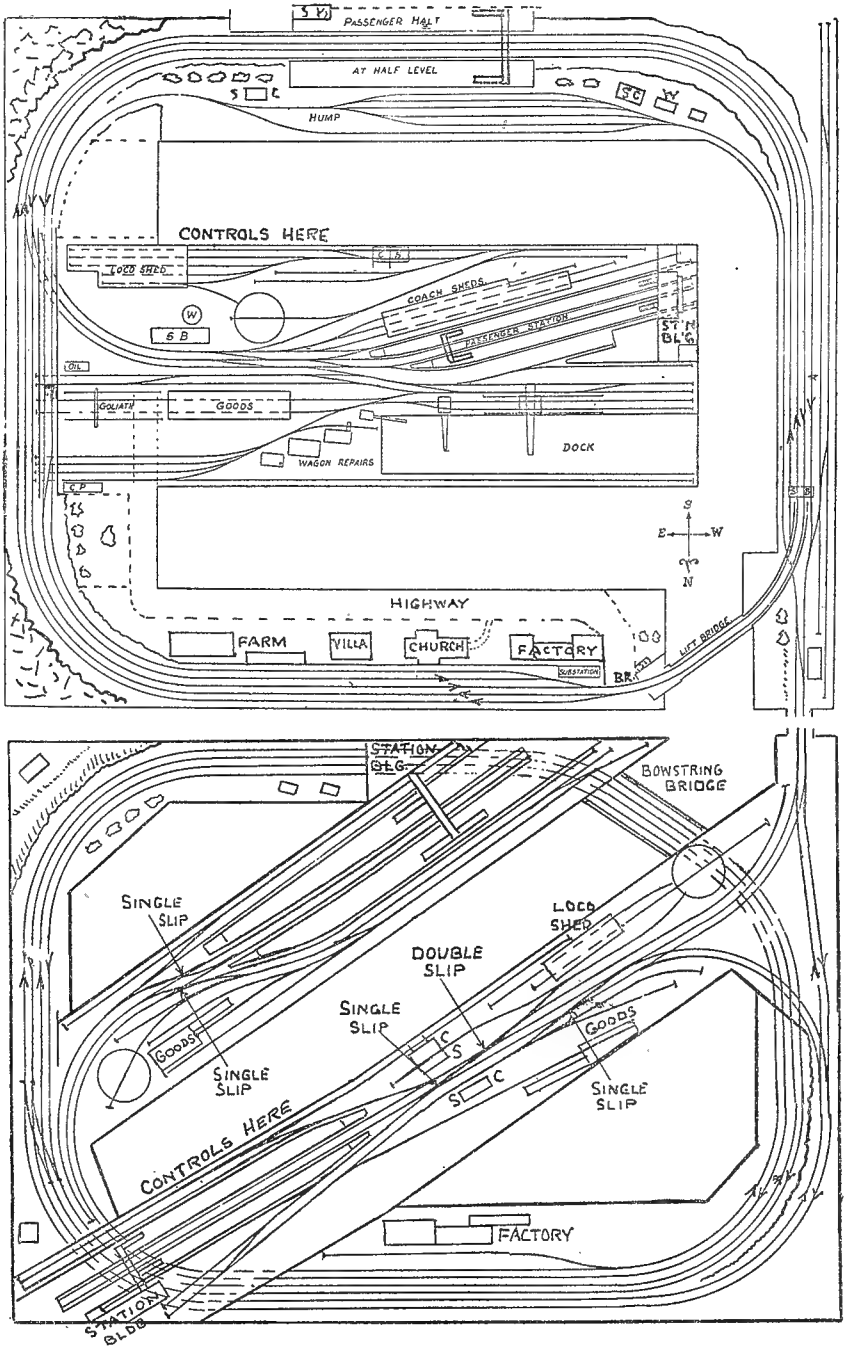

PASSENGER HALT
AT HALF LEVEL
HUMP
CONTROLS HERE
LOCO SHED
COACH SHEDS
PASSENGER STATION
GOODS
GOLIATH
WAGON REPAIRS
DOCK
HIGHWAY
FARM
VILLA
CHURCH
FACTORY
LIFT BRIDGE
STATION
BOWSTRING BRIDGE
SINGLE SLIP
DOUBLE SLIP
LOCO SHED
GOODS
FACTORY

Fig. 281.

" The two termini are interesting. Methven is a single platform high level station with low-level approach, a public road running along the whole of one side, and continuing beneath a box girder bridge to the goods yard and to a gravity coal depot opposite. This station is used for joint traffic, the L.N.E.R. having running rights by means of which connection is made with the L.M.S. for Laurenceton. New Elms is different and somewhat novel in design. Both stations are equipped for the housing of locomotives and have the normal examples of goods and passenger buildings."

We will term the next reconstruction scheme Layout No. 4, though strictly speaking two new layouts were undertaken in 1937, when it was decided to scrap the entire system and inaugurate a truly worthy West Midland. The plan of the two rooms is given on page 140, the rooms, of course, being the same. Really, this was the first engineering-like effort in which nothing was to be tolerated that was not correct or that would militate against the builder's responsibility as a technical writer. A description may be quoted from a published account.

" It will be seen that the entire track is now double-road. There are, in fact, three controllers in use with the constant potential system of wiring employed, one for the up road, one for the down road, and the third for the various yards and sidings, the latter including the main terminal, the hump yard and its approaches and the factory tracks alongside the west wall. The main terminus was planned with the collaboration of Mr. Ian Frazer, B.Sc. For the hump yard, there are proper approach sidings extending for some distance over the three-span bridge to the east, and the outlet of this yard gives upon the main down line near the door. It is thus possible to handle approaching and departing trains with great convenience. The proposed plan of the tracks for the second room, which has not yet been dismantled, is shown.

" An innovation was provided, to begin with, in the form of baseboard used. A pulpwood known as Treetex was called into service, and has proved, so far, in every sense faultless. True, it needs slightly extra care in laying, and requires to be well battened underneath, if it is intended to place any great weight upon it ; but this is an easy matter to adjust. Its advantages are many. First, it is almost seamless, each of the five main sections being entirely in one piece. Secondly, it will not shrink, twist or warp under any conditions. Thirdly it is cheaper than ordinary boards ; and fourthly, it is delightfully soft to work on, while at the same time providing ample stability for the retention of the track-spikes and so forth. A further feature is its surface. This is impressed with stippling which gives a fine appearance to all manner of representations, whether a black-painted asphalt yard, a green field, stone-grey ballast or a road. The finishing of the terminal yard surface, for example, was most simple and convincing. The tracks were laid on the bare Treetex and finally the whole was painted with flat black

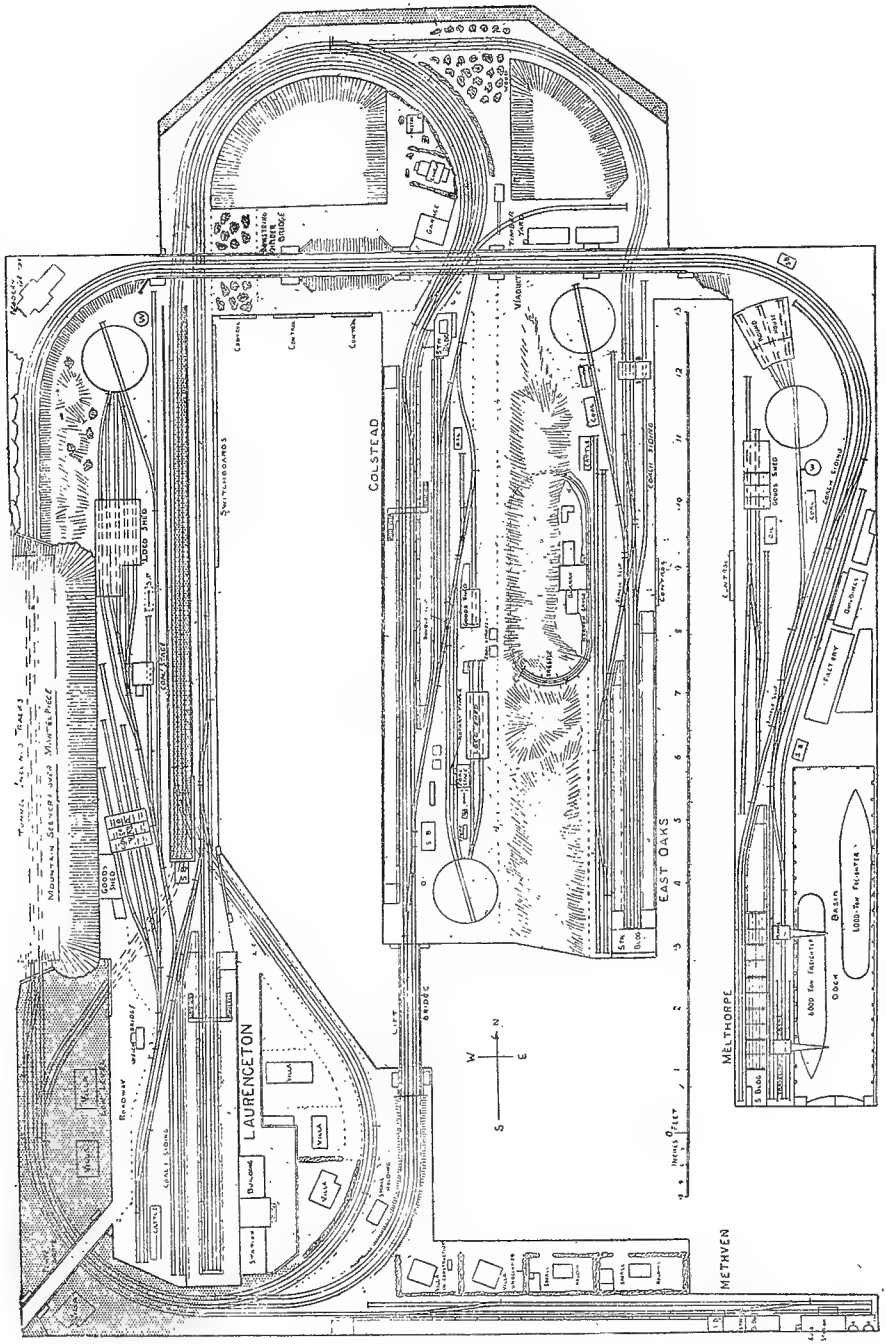

COLSTEAD
LAURENCETON
EAST OAKS
MELTHORPE
METHVEN
VIADUCT
BRIDGE
GOODS SHED
Basin
Dock
N
S
E
W

Fig. 282

oil paint, the top of the rails only being wiped off. The resultant appearance is perfect. On the main line, the tracks were laid on the surface, which was first painted flat grey for ballast. No felt is supervened.

" The layout scheme is that of a quadruple main line providing a continuous run and also approach and departure off-shoots. The through station, which is simply a passenger halt, is so arranged that when on the continuous run all trains take the fast inner tracks, and thus avoid the inconsistency of touching at the same platforms in repetition.

" In the composite picture, which shows the hump yard, this station—unfinished but for the bare platforms—is shown. The various roads are graded as required, the steepest incline being 1 in 56. Five-foot goods or passenger trains take all slopes without serious difficulty. In order to secure maximum length for the main terminus, this was laid in the opposite direction to that of the island in the former layout. The lift bridge is now located at the door and is the sole obstruction crossing the operating space at any point.

" The layout of the second room will be even slightly more elaborate, and will have three levels instead of two. Ample length for the two stations has been obtained by designing these diagonally and face to face with each other. One of these stations is a terminus with a triangular entry, the other a plain terminus. In the second room, also, a continuous run is secured by a different arrangement from that of the first room.

" Some notion of the fascinating complexity of the trackwork in the terminus may be gathered from the photo of it. It may be mentioned that, in order to cross trains from the locomotive sheds to the goods yards, all three main controls have to be set in unison. But it is possible to run two trains at speed around up and down main lines, while also manipulating trains in the goods yard or engines in the locomotive department. The introduction of this feature has added unimaginable attractiveness to train operation, and to the general interest of the layout. It will be seen that the former locomotive shed still remains, though almost all else is new, the bridges excluded. In one of the photos are a number of the new Exley coaches, fitted with " Runeezi " bogies, and some notion of the station building is supplied. Another photo gives a facing view of this station with its platforms as it was before the coach shed was built. The main purpose of this shed is to shield the stock from sunrays, which happen to fall powerfully on this portion of the layout.

" The hump yard is a very outstanding feature of the new station, and has a number of original gadgets. One of these is the provision of screws for adjusting the gradient of the incline for the hump, though no actual and unsightly hump track is included. Every wagon breaks away on the hump track and runs down exactly to the centre of the sidings under its own velocity and without any push.

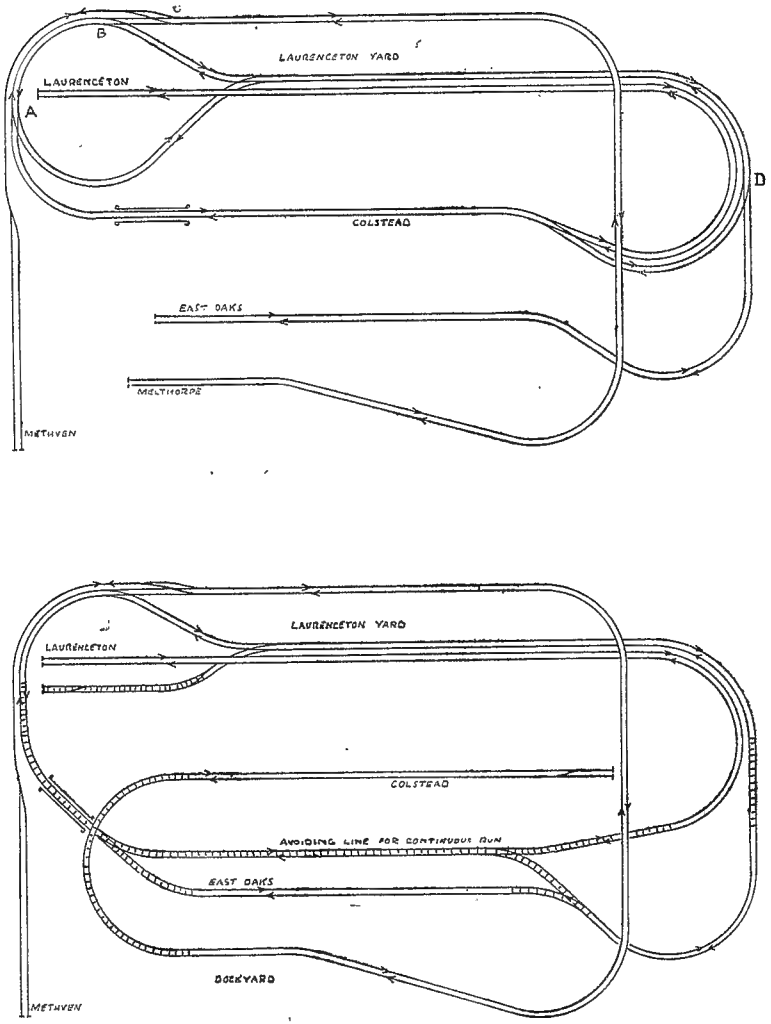


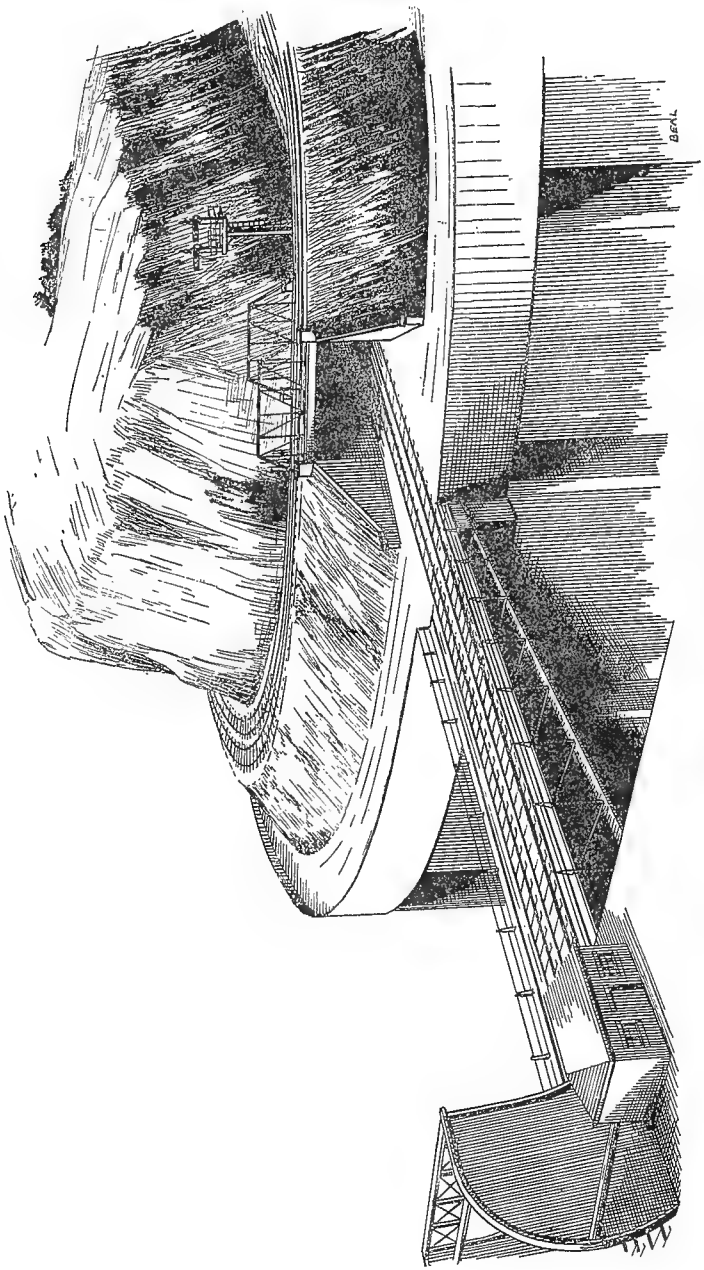
Fig. 283.—The West Midland Railway as laid in 1944, and below, as re-laid.

The hump yard section is itself under the control of three section switches, one for the approach, one for the incline, one for the exit end."

These layouts were in use from the time of the inception until 1940, and it was during this period that the system really developed into its present form. The engine stud was considerably enlarged by the addition of a super-detailed Royal Scot by Hamblings, a Pacific L.N.E.R. tender engine, a Footballs class, and the illustrious "Jamaica" 4-4-0, which was a repeatedly re-built Bond locomotive, as well as a Varney Pacific free-lanced by the author for British practice. There were also a number of reconstructed cast-body tanks of various wheel arrangements, and a sturdy shunting engine for each of the three termini. Excellent running was secured for passenger stock, derailments being almost unknown in this department, but unfortunately some of the large goods yards were never equipped with conductor-rail, and goods traffic movements, though perfectly satisfactory on the main lines, could never be extensively carried out, for it was necessary to push trains by hand over the non-energised sidings. A splendid equipment in passenger stock was secured by gradual steps, all Exley-built, and all other such stock was scrapped or disposed of. Considerable exploits were carried out in freight equipment, scores of hand-built wagons, opens, vans and special types being installed in service. The system was almost fully signalled with Merco-Midland electric signals, much of this electric equipment being specially designed. At one point, where the double crossover occurs on the main line, points, signals and current-supply were interlocked with the point levers, there being no fewer than sixty-three alternative current movements at this one location. The scheme gave faultless operation. Much care was lavished upon scenic effects, dozens of new architectural features being added.

This era also saw an unusual number of visitors, many of them well-known railway authorities. They included Mr. Ian R. Frazer, Mr. N. Sheppard (Locomotive Superintendent on the Dibur-Sadiya Railway, Assam), the late Mr. Harvey Riach (then L.M.S. District Engineer at Perth), Mr. D. W. Barrie (Passenger Superintendent at Perth), Mr. Cecil J. Allen and many others. Well-known figures in the railway modelling world were also entertained—John H. Ahern, J. Smitherman, Fleetwood Shawe, W. K. Walthers, Allan Lake Rice, Lester Friend (President of the Massachusetts M.R.R. Society), Major Sparkes R. G. Vacy-Ash, G. Mellor, Sir Eric Hutchison, Rev. P. H. Turnbull, and Air-Vice-Marshal T. A. Warne-Browne, not to mention by name many others from India, China, Jamaica, Canada, New Zealand and Australia.

In 1942, the writer removed to his present incumbency and the West Midland found fresh terrain to serve. The work of dismantling the layouts appeared, on contemplation, to be colossal; but a fortunate snow-storm occurring precisely at the right moment, liberated the two sons of the house for two weeks from their



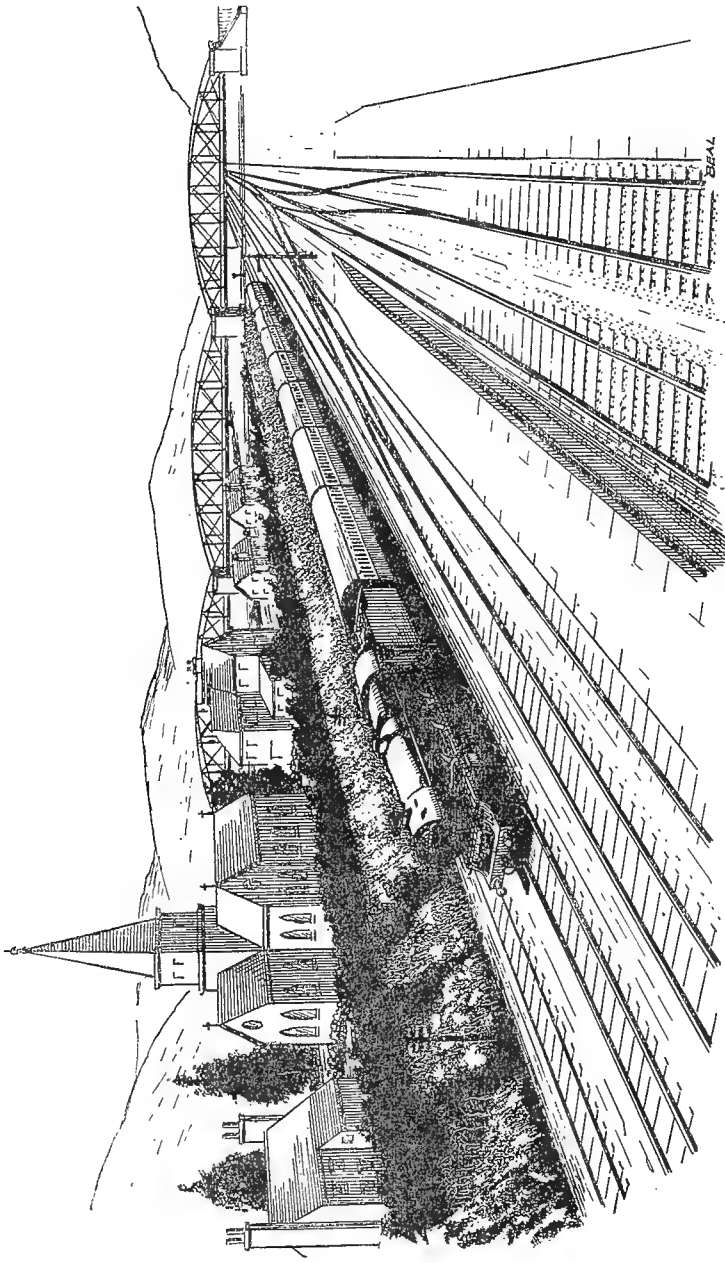
Sketch, showing arrangements near entrance, with lift-bridge, hills and looped track.

work, and they undertook the task of uplifting all the track, removing all the erections and dismantling the baseboards, bridges and viaducts, while the "old man" gave himself the task of packing. The entire work was compassed and completed in two weeks of brief working days, and the West Midland was removed, lock, stock and barrel, to its new environment.

The system now bears little resemblance to its predecessors, save in the matter of rolling stock. The site is a large ground-floor front room 21 ft. by 14 ft., with a large bay window at one end, which is itself fully occupied with trackage. The baseboard is raised from the floor to a height varying between 3 ft. 2 in. and 3 ft. 10 in. Work of demolition and reconstruction were alike somewhat phenomenal; in ten days the old line was completely dismantled and packed, and the new layout was started and completed in the space of about twelve weeks, the latter task involving the designing and building of many new structures. Trains were actually running over the entire length of the main lines within six weeks of the inception of the work.

It will be seen in the plan on page 142, showing the new system that the railway is not only successfully embraced within a single room, but that it comprises even more stations than did the earlier one with two apartments. Principles for many years advocated by the directorate have been rigidly adhered to—all obstructions across main operating spaces have been reduced to one lift bridge; all the terminal stations are adequately equipped with train storage sidings; there are no platforms shorter than 360 ft., the prevailing length being 450 ft. and occasionally extending as long as 570 ft. In the instance of the bay window it was necessary to have some form of stoop-under arrangement in order to gain access to the blackout curtains. An effective arrangement of embankments serves to lend a realistic appearance to these apertures. It was found possible to include in the new layout all the former bridge and viaduct equipment. As before, also, there are three distinct levels. I have attempted in the plan, around the complicated area of Laurenceton, to avoid, by stippling, any confusion of these levels; and the illustrations also may help to make matters clear. Considerable interest and not a few problems were added to the scheme by the embodiment of a double-track reverse-loop at this point.

Laurenceton, the main city terminus, lies on the west side. Leaving this station, the track passes north alongside inclined tracks, then under the bow-string girder bridge, around the four-track establishment, selecting the curve at the junction and passing beneath the west end of the three-span viaduct to the through station known as Colstead. Here, access is gained to what may be used as a continuous or indefinite run or simply a point-to-point main line. This crosses the Scherzer lift bridge immediately on leaving the station and bears down on the lowest level of the system extending as far as the double facing junction on the



Sketch, showing train on new avoiding line behind Colstead Station. The spectator's stance is at a point behind the buildings.

extreme south side. Passing to the similar junction on the west side, and just beyond the last-mentioned junction, trains take the curve and pass through the tunnel under Laurenceton Station, climbing the incline in the cutting until the junction on the north is reached. Here may be taken either the curve for the repeated journey or the straight track for East Oaks.

The opposite extremity of the system from Laurenceton is Melthorpe, which comprises a considerable docking centre and an industrial town. The main line approach from Laurenceton to Melthorpe diverges at the double junction on the west side and takes the long, straight tunnels, over an ascent of 1 in 40. When the north-west corner is reached a turn is taken to the bowstring girder bridge and then by the three-span viaduct to the seaport destination. There is one other station, Methven, by the doorway, which represents a rural suburb of Melthorpe served mainly by rail-motor trains, the route being by way of the bridges and through the western tunnels, beyond the point where double track converges into single line. The original plan was to equip this route, along with Melthorpe passenger tracks, with an overhead catenary, and sooner or later this may be done.

Laurenceton is backed with residential and industrial scenery, and it is here that the main locomotive centre is situated. The turntable, the first to be completed, is of the well type, the five-track rectangular shed being built in modern concrete style. Hipped and louvred roofs, constructed out of the solid, cover the building, which has both ends open and without doors, in keeping with modern procedure. Approach can thus be had from either end, so that tandemed sectionalised roads can be introduced without running difficulties. Coaling facilities are provided by an American type timber stage, and there is a large freight warehouse with covered and glazed yard. Highway access is to be had to this goods depot over a plate-girder bridge spanning the railway. Mountain scenery extends along this western side, terminating from the background in foothills through which the inclined tunnels are pierced. This was found to be the best method of getting rid of an exceptionally long mantelpiece ! The method of carrying out the mountain construction was interesting. It consisted of cutting serrated shapes of plywood, behind which brown linen was tacked, and which were firmly screwed to the mantelpiece through wooden blocks. In front of these boards there were piled lumps of actual rock and discarded brickwork, over which the linen from the back was strained and tacked down to the front edge, the whole being later painted in suitable shades of brown, slate, yellow, cream and purple, while trees completed the scene. The trains run beneath the mantelpiece, so that immediate access can be had to them by merely stooping under the baseboard. The station buildings at Laurenceton are approached by an inclined highway. Numerous villas and small buildings occupy the immediate foreground. Bridges over the junction tracks under

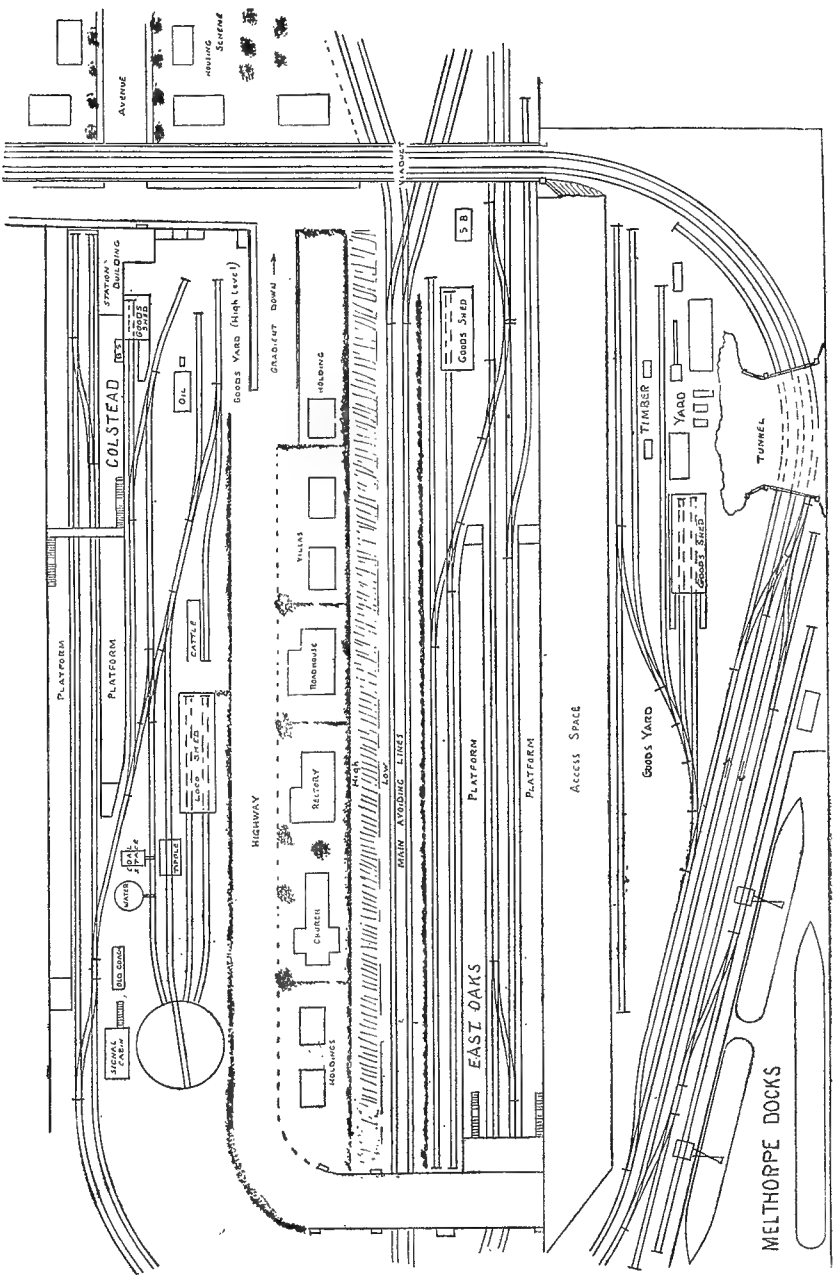
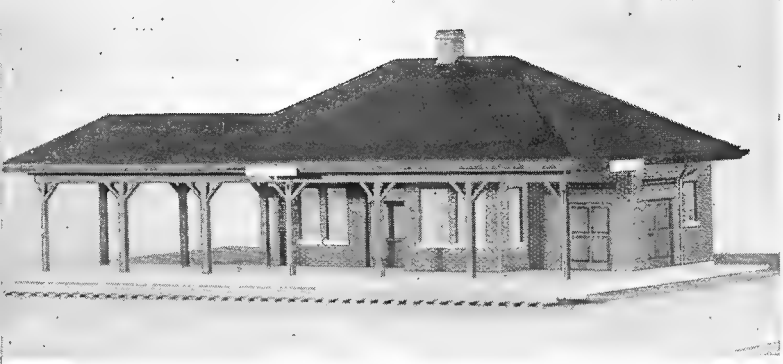
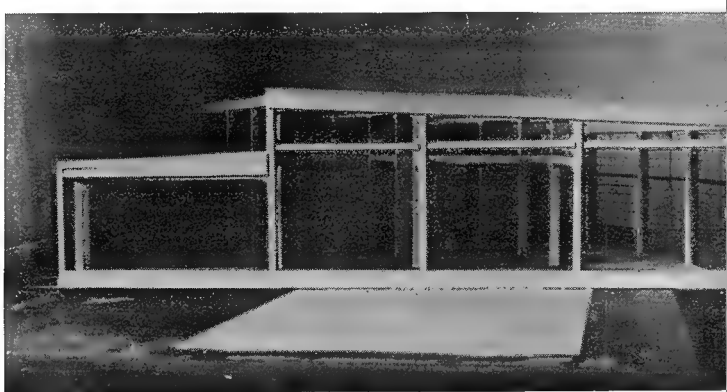


Fig. 284.—The central and reconstructed portion of the new layout—1944.

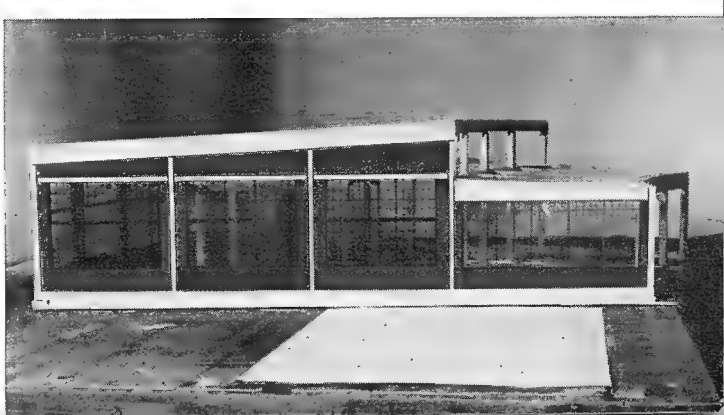


A suburban station in brick.

(Photos by Model Structures Co.)



A roundhouse under construction.



Consolidation and Mikado American HO-gauge models by Mantua Co.

Laurenceton are of the box-girder form, being correctly arranged according to engineering standards, and the retaining walls of the cutting are arched.

At Colstead there are facilities for turning and servicing engines, so that the station, a main line junction, could be worked as a terminus. The engine depot has a double-stalled shed and a modern small-capacity coal chute in concrete which is provided with a working rotary wagon-tipple. There is also an oil depot and a goods shed. A set of double-slip points render the yard easily workable for all purposes. A timber yard is also served from this station.

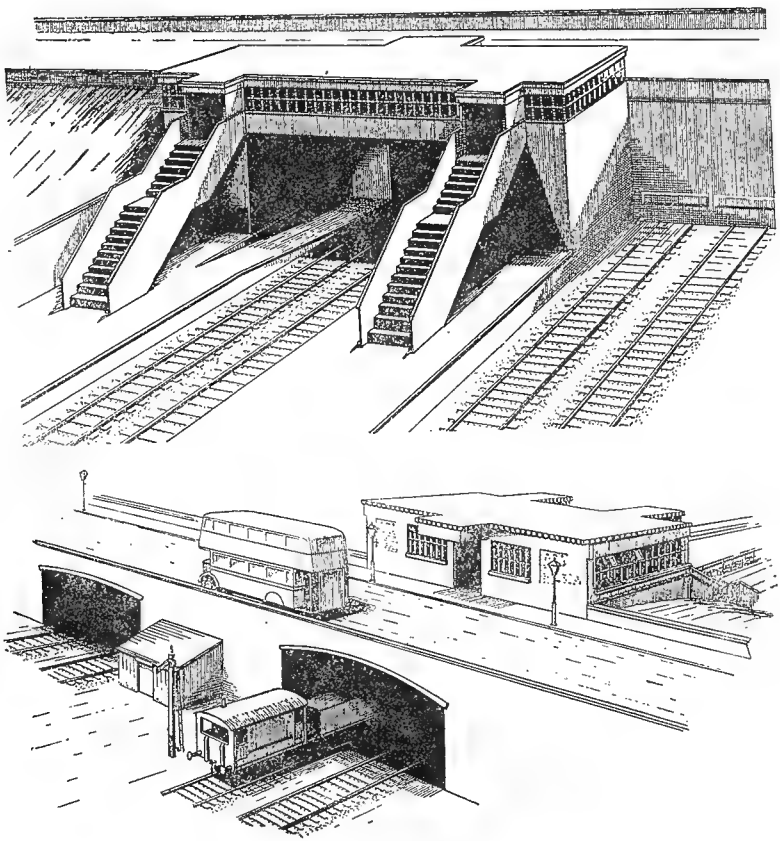
The hilly region between East Oaks and Colstead was at first an open operating space. It was found, however, that the peninsular baseboard accommodating the former station was of too fragile a nature to withstand the movements and perambulations of visitors ; so the aperture was boarded over and the hills added. The scheme proved a useful one, for the hills both hid the one station from the other and provided the site for a quarry at East Oaks. This is not yet completed, though experiments with a 12-mm. gauge engine are being carried out. East Oaks station buildings are of modern design, occupying merely the extreme ends of the two platforms.

Melthorpe has a dock basin large enough to accommodate quite a fleet of scale vessels. At present there are two brand new 6,000-ton freighters at their moorings along with a number of smaller fishing craft. One of the freighters was destined for America, to the order of a well-known manufacturer, but the war intervened ; its first post-war voyage will therefore be across the Atlantic. The ships are both built strictly to 4-mm. scale, the hulls being in two parts, sectionally joined, to facilitate packing. In their recent journey by rail from Dundee the two vessels were packed in a single tea box. There is at Melthorpe an island platform with an exceedingly attractive glazed roof. At the depot there is a new three-stall roundhouse and a water tower after the American pattern. Extensive factory buildings occupy the background adjacent to the docks, the remainder of the east side being backed with a beautifully-painted 9-ft. length of lake scenery, terminating in shipping views and warehouses behind the dock basin. Track arrangements are somewhat unusual at this station, but are very good to work. Goods arrival trackage is used also for passenger departure, though goods trains can also arrive directly at the waterside.

At Methven there are no goods facilities, excepting a coal siding for the Methven sub-station of the West Midland Railway. This sub-station is built to match the passenger building in concrete, and also serves to conceal the room lighting switches.

Scattered about the layout there are endless numbers of constructional models, comprising two churches, a large country roadhouse, a roadside garage, three smallholdings, a villa under construction, and another completed but unoccupied.

The wiring-up of the layout was at first intended to have a single control for up and down trains. This was merely an expedient for the purpose of getting trains going. It meant, of course, that only one main line train could be run at once. My old friend Sir Eric Hutchison, on a recent visit, constructed six new control switches, which are beautiful in their delicacy of response; and he persuaded me to get on with the separation of the up and down current supply. It was a somewhat colossal task, but it was done. Two controllers went to the main lines and one each for the station yards. Methven has yet no separate control. But there turned out to be one snag, so far insuperable, in the way of this separate main line control—at the reverse loop. Here, of course, the up line becomes the down line for some distance, and therefore both controllers have to be called into service, whether for up or down traffic. There does not, to my knowledge, yet



Front and rear view of East Oaks Station.

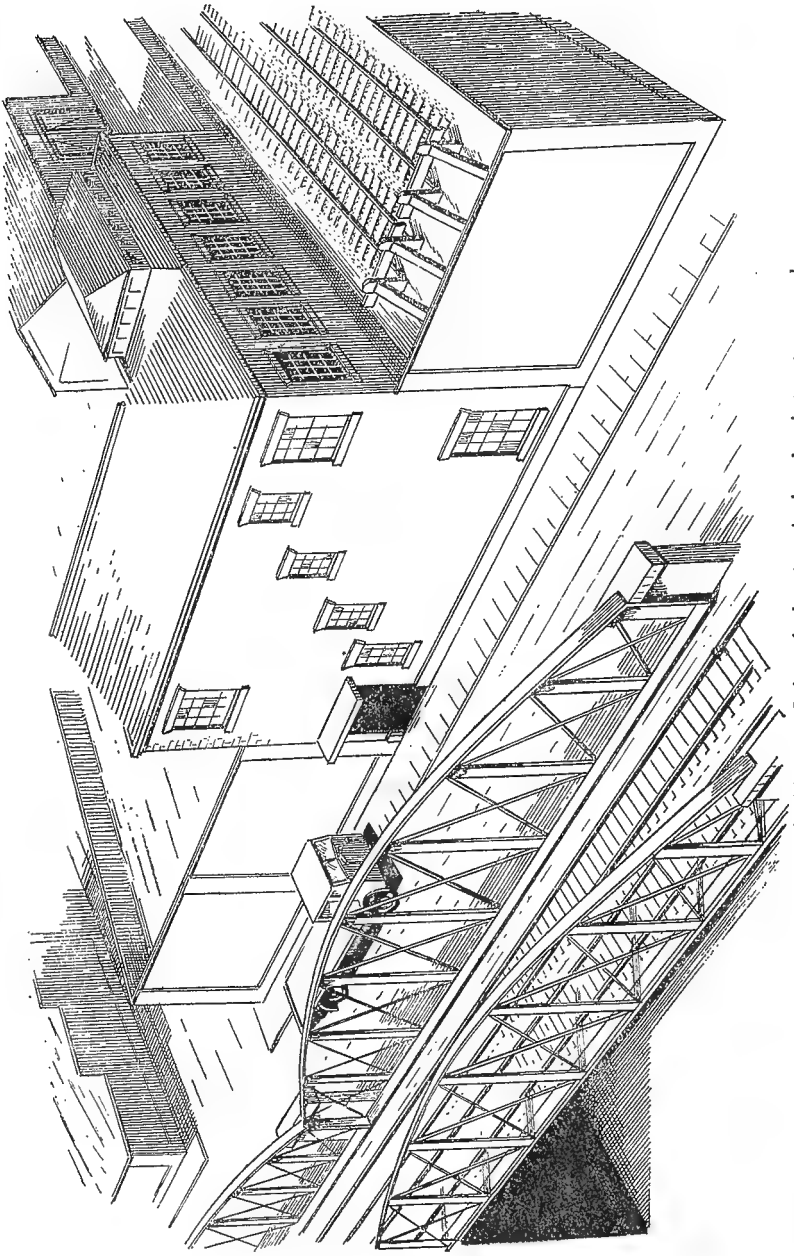
exist a solution to this problem in the case of double-track. I have inspected one for single track, but am sceptical about its efficacy. Possibly some day a device may be discovered, other than by employing a two-way switch.

It may be quite frankly admitted that even this new system by no means completely satisfies the builder. At some early date, by a slight reconstruction, a connection will be made by double-track main line to enable trains to avoid repeating their journey past Colstead, and, instead, to take the points which lead to East Oaks on their second round of the tracks, thereafter passing once more to the main line over a new bridge. Alternatively, it may be decided to make this loop an entirely new one and invisible, running it beneath the hills which separate East Oaks from Colstead, and thus making the continuous run indefinite in length. But so far it will serve its purpose, which is to give pleasure to the household and to interested visitors, and to provide the owner with scope for endless experiment. A definitely contemplated step is the reconstruction of the entire layout, immediately this is possible, using two-rail track throughout. This may probably lead to the discarding of the whole of the present baseboard in order to allow undulations in the surfacing and the utilisation of the writer's own type of two-rail track.

More improvements were really conceived during an enforced holiday in the country, when the writer had little to do but tinker about with a pencil and drawing-board in a shady garden. Certain elements of discontentment with the layout as it had emerged persisted at that time in asserting themselves, and a theoretical effort was made to touch things up and think things out—a line of action which is cordially commended to all prospective builders, even after their building is well on the way. The result was a new set of drawings depicting a new design, in which the following advantages were to be secured :—

No more inaccessible points.
The two main termini within simultaneous reach.
An independent continuous run with no halts.
A concealed, though not tunnelled, link with this continuous run.
A much longer inter-urban run.
More space for advantageous placing of architectural models.
Reduction of the main gradient by over 50 per cent.
Entirely separate control for up and down main-line traffic.
Elimination of half the number of turntables.
Levelling of Colstead station, which hitherto had a slight gradient.
Elimination of points below three-span viaduct.
Occupation of unutilised space near entrance.

The only item in this list which has not been strictly adhered to in the work now completed is the first ; and it is worthy of note that, notwithstanding, two of the four sets of remote points have been dispensed with.



The new station buildings at Colstead, showing the low-level street approach.

Separate plans of the main line, as it was and as it is, are given in Fig. 283. A complete plan of the layout as it was is given in Fig. 282. An additional advantage secured, beyond those enumerated in the list, was the abolition of the double-track reverse loop around Laurenceton station. This former arrangement served no useful purpose whatever, and was an insuperable snag from the standpoint of electric control. In a word, it was impossible to run a train around it in either direction without requiring the " up " and " down " controls simultaneously in use ; and this made it impossible to run any up train and a down train at the same time. A still further advantage is that there is now secured a total main line run in either direction of fully 200 ft. when the continuous section is correctly brought into service. Thus, starting from Laurenceton, the route is first around the loop on the east side, then by way of the avoiding line, across the lift-bridge, up the incline in front of Laurenceton Yard ; then by way of the east loop again into East Oaks station. Thereafter, the bridge again is crossed, the avoiding line again taken, and the points set for the gradient behind Laurenceton Yard, then over the long viaduct, around the inner west loop and into Colstead terminus.

The work of alteration first began with the raising of Colstead station an additional 3 in. Coincidentally with this task, the hills between Colstead and East Oaks were removed, and the baseboard extended on the level to form a country village road with rear sites for a long row of villas, a roadhouse and a church. Several new items have been specially constructed for this road. The idea behind the placing of these buildings is that of forming a screen for the concealment of the avoiding line, the spectators' stance being located between Laurenceton and Colstead stations. The sketch will make this clear. A second sketch will afford some idea of the rather picturesque arrangement of tracks, hills and bridge at the new location near the door.

An interesting feature of the track alterations is that the utmost was made of existing roads. In the second plan the actual sections of newly-installed track are indicated by cross marks. It may be mentioned that no new track whatever was really required for the improved layout ; the points removed were all satisfactorily worked into their new places, and the various curves and straights were throw-outs from the work of dismantling. A few feet of straight track were, as a matter of fact, found in the store box for use on the avoiding line, but this was old, and mainly in lengths of less than a foot.

The inter-urban route to Methven, now extended from Colstead, but which earlier ran from Melthorpe only, is, of course, almost double its former length, and some day this route may still be equipped with overhead current supply. The station at Melthorpe was entirely excluded, though the freight facilities and the docks remain, a supposed adjunct of Colstead station. Where the original reverse loop was removed, it was not desired to dispense with the rather effective skew

bridges at Laurenceton ; so the double turnouts were simply extending into sidings for a factory on the low level in front of this station.

The running capacities of the improved layout are extraordinarily good. The slight trouble experienced with the northern incline through the tunnels is wholly done away with, there being scarcely any rise at all on the new scheme. There are good operating spaces between East Oaks and the dockyard, and within both the east loops.

The wiring up of the West Midland was carried out some four years ago, when the removal was made, and was really little more than an expeditious bungle of mixed leads and cables hooked up with the intention of getting things running. It was well known then that the jungle of wires behind the scenes was a hopeless mess, and the resolution was registered at the time to replace the scheme—if scheme it could be called—as early as possible. A recent visit on the part of Sir Eric Hutchison on sick-leave was seized upon as a fine opportunity, and during his sojourn, with the writer's assistance, the work of re-wiring was done.

The new scheme involved several fresh departures that are worthy of mention. Its central feature is a diagrammatic control board, a drawing of which is here given, on which the entire outline of the layout is accurately drawn out. The board is finished in polished black stain, the up and down tracks being blue and red respectively. In Fig. 285 the red line is shown dotted.

One of the aims in the new control system was to sectionalise the current supply within the control of tumbler switches, so that at any moment a possible short-circuit could be located in a few seconds. The circular rings in the drawing represent these switches, and it will be seen that each one controls the single track for a given length within the various breaks. All that is required, should there at any time appear an indication on the ammeter of a short, is for the whole of these switches to be cut out and then cut in one at a time until the ammeter betrays the position of the trouble. Hours of weary searching are thus avoided, not to mention the wear and tear on batteries. The section switches are also useful along the main line when a train requires to be held up for any cause.

Located also upon the control board are the spring pushes for all the remote electric points. These are shown in black dots on the plan.

All leads and cables to outlying places on the layout are now properly and methodically arranged, and labelled at every 6 ft. or so. Each wire can be identified in a second or two at any place in the room, and there is no need whatever to follow its course in order to find out where it goes. The electric points themselves have in many instances been re-arranged in conjunction with their machines, in order to give a better distribution for power-operation.

The original main control switches were six in number and were themselves designed and built by Sir Eric Hutchison. In the new scheme the same controls

are employed, one each for the up and down main lines and one each for the four station yards—at Laurenceton, Colstead, East Oaks and Melthorpe docks. The adjustment of the resistance capacity was never actually made in the original instance, and the speed in starting and stopping was always jerky and spasmodic as a result. But it was found that all that was required to set this defect in order was the shortening of all the resistance wires on the switches. After experimenting on one of the controls, the most perfect and gradual movement was secured, and the trains now start off at a crawl on the first contact of the switches. The controls for the various yards, of course, are situated immediately in front of the yards

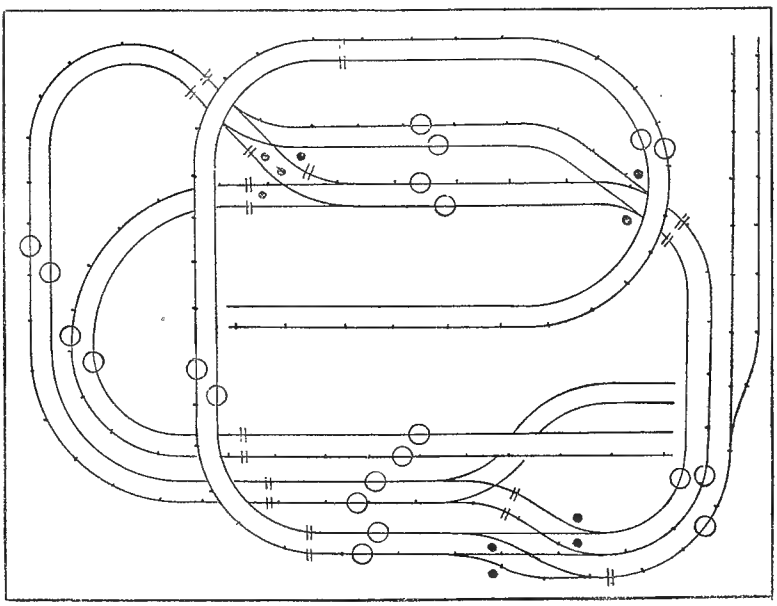


Fig. 285.—The new diagrammatic control board.

themselves. The up and down main line controls are near the diagram board, and have between them the ammeter and the voltmeter, as well as the main double-throw cut-out switch and the charging board switches for the transformer and batteries.

Adjacent to each of the station yards, also, there is a small switchboard with the section plugs for all tracks within the yard, so that entirely separate control can be had for the yard tracks in almost every instance. Trains and locomotives can be stalled anywhere within the yard limits.

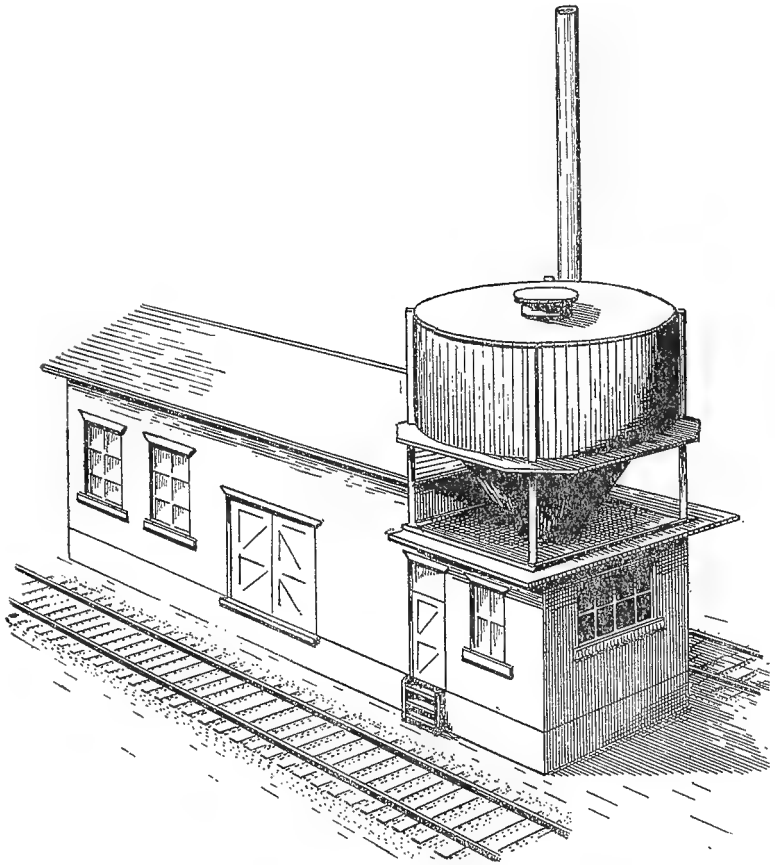
The electric signalling is not yet finally installed on the system, though there are numerous instances of starters and other signals in movement temporarily. The actual working out of a perfect system is being relegated until after the end of the war. The writer's idea is to develop a scheme whereby, on setting in the main current at a station, the first operation goes to the starting signal, and is thrown in from that point subsequently by means of a slow-movement thermo-switch to the track. In this manner a suitable interval of time will necessarily elapse between the throwing off of the signal and the gradual starting off of trains. Unfortunately, at the present time no such switches are obtainable, though in normal times they are a standard everyday production.

The alteration of the height of the station level at Colstead, the conversion of this station from a through to a terminus one, the prolongation of the tracks beyond East Oaks, and the reconstruction of the layout near the docks are items which have involved a good deal of architectural as well as engineering work. A full plan of the central section of the layout, within which space most of these developments were carried out, is given in Fig. 284, and this should serve to cover the whole of these new projects.

At Colstead, after the baseboard was raised to its required height, as little alteration of the existing layout as possible was carried out. Enough space was secured between the three-span viaduct to allow for a public highway affording a low-level frontage to the station edifice to be erected. In an inward direction beyond this point a graded road was constructed to rise to the high-level public thoroughfare along which various houses, cottages and larger buildings were to be set up. The building site for the Colstead station was rigidly determined by the engineering conditions prevailing, and the sketch shows what was made of the conditions. Unfortunately, the standpoint permitted to spectators does not afford a very ready view of the frontage of the building unless passage is made to another section of the room. It was found possible to incorporate in the main building the rather attractive lantern roof from the old structure, and the station frontage at the street has a suggestion of a rising stairway to the higher level within. The local goods shed is immediately beyond the passenger concourse and has an excellent yard approach for road vehicles, as shown in the plan. On the opposite side of the viaduct there is a projected scheme for a garden village, many of the houses being already completed, though the scheme itself is not yet laid out. The station buildings are finished in scale red brick with correctly glazed windows.

Immediately behind the row of villas on the high level there is a steep embankment, beneath which the up and down main avoiding lines run. East Oaks station bears little resemblance to its former self excepting for the two platforms. The old depot was a terminus, and the continuation of the tracks involved a high-level street approach. This is shown in the sketch on page 152, which gives an idea

of the front and rear. The building is not yet completed, though it will be almost an exact replica of a structure in concrete style made for an acquaintance. The design is based upon one of the London suburban stations of the modern type and has a most effective appearance. The stairways were the most exacting task; but it was found comparatively simple, after experiment, to use as the foundation for these some of the pre-war solid wood stairway sections produced by Hamblings. The platform end ramps were shaped from solid wood and were faced up, with the platforms, by using G. N. Slater's platform piers and cornices. The windows are formed in lengthy strips of celluloid having some of the sashes modelled as open—a very easy procedure, but one which is most effective.

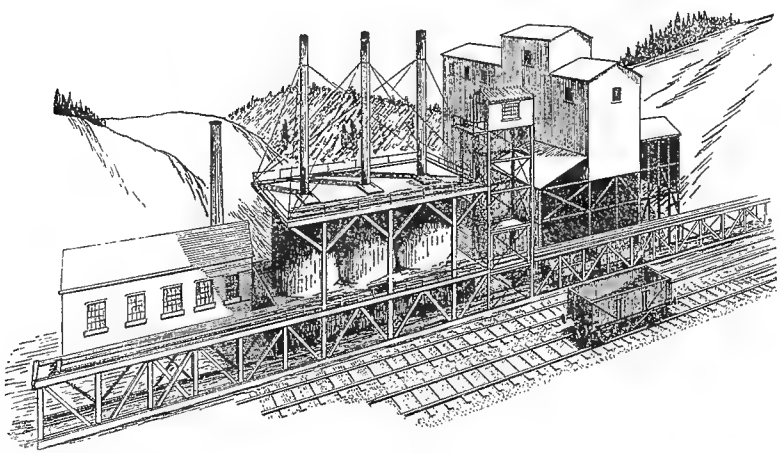


A water conditioning plant serving as an ashtray.

Melthorpe Docks are to undergo a complete reshaping, the former S-bend in the main line and other tracks is being eliminated, and more space for the dock basin is being secured. The projecting section of tunnel on the east side of the docks has an important purpose. Behind this tunnel there is a new section of lake and mountain hand-painted scenery, which is executed on plywood. Owing to the nearness of the curves to the wall, there was no space for the insertion of this plywood backscreen. It was, therefore, decided to fix it higher up on the wall, leaving a space below, and to fill out this space with projecting hills covering the tracks at this point. The whole of the background on this wall will require to be remodelled, in order to match the sky-blue of the 9-ft. hand-painted section.

A fascinating feature of the station at Colstead is the new electric turntable, which is the first sample of a Modelcraft production and is operated without an actual motor, the propulsion being secured through the oscillating movement of alternating current passed through a transformer. It is a great success as a mechanism, and it is fitted with locking bolts of the writer's own design by which the stop can be arranged for any one of the required tracks. There is absolutely no gearing involved in the mechanism, but the movement is perfectly silent and dead slow.

Another interesting feature is a miniature water-softening plant the design of which is shown in a rough sketch. The tank which is supposed to store the water is actually an ashtray, with removable lid—a commodity badly required now that an effort is being made to keep the whole place reasonably tidy and attractive. The only difficulty is to get visitors to use it!



CHAPTER VIII

AMERICAN RAILROADS IN MINIATURE

DURING recent years large numbers have been added to the ranks of those whose interest centres rather around American models than around British. Many of our military men and seamen have been to the United States on their voyages or during their training, and if they carried with them a railway interest many of them immediately became captivated by American practice. Others shared this enthusiasm long before the war. Since in that country the prevailing volume of zeal for railway modelling devotes itself to the miniature scales, it is only proper to include in this book some reference to what may be done over here by those who wish to own American-type layouts.

For some years prior to hostilities, numerous agencies from America were lodged in this country, and magazines like the *Model Railroader* and *Railroad Magazine* had distributing offices in London, where they established considerable circulations. Firms like Mantua, Varney, and others were beginning to sell their HO-gauge products extensively, and were advertising in British publications. Lionel, and Gilbert, firms in America providing commodities akin to those of Trix and Hornby here, had their London offices. It should be pointed out that American HO-gauge products are the same, approximately, in their overall dimensions as our British OO-gauge. They are modelled to a scale of 3.5 mm. to the foot, but, because actual railways in America build to a much larger loading-gauge than our own, these models were much the same size as British models (4-mm.) of stock to our smaller loading-gauge. There is, therefore, no appreciable impediment in the way of using designs for layouts and certain other details laid down for British modelling. A favourite scheme was that of using both British and American models on the same layout, and of thus following free-lance practice much like that adopted in some of the colonies like Jamaica, South Africa and Australia, where locomotives and stock following home, American and even Continental practice may be seen in the same service, and where in some instances Buckeye couplers are used in conjunction with link-and-pin and spring buffers.

There is a certain attractiveness in modelling in the American style. A vast range of splendid components can be had ; the Americans have in a few short years surpassed us in their enterprise. There is something immensely attractive about certain American features—their huge engines, as also their smaller type, their large viaducts and bridges, their vast stretches of single-line meandering tracks, their rugged scenery and titanic mountain ranges and tunnels, not to dwell on their catchiness and acceptability in propaganda. One need not be astonished if this phase of modelling increases. A single factor which at once commends

itself to workers in two-rail is that American flat-bottomed rail lends itself admirably to that system.

Much that has been said in these pages, and a great proportion of the guidance given, will be found to apply with equal relevance to the practice of any country. But it is proposed in this chapter to furnish some idea of what can in normal times be had for the executing of this work, and also what are the broad standards to be followed. It is a highly unfortunate matter that the present situation makes it impossible to gain access to an immense store of illustrative material depicting the splendid work carried out by our cousins in recent months, which under ordinary conditions would have been placed liberally at our disposal.

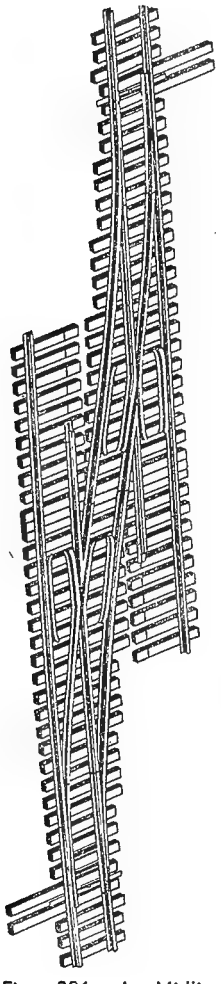


Fig. 286.—A Midlin two-rail crossover.

So far as track and layout are concerned, the normal American procedure in HO-gauge is to work in two-rail, though third-rail devotees are by no means unknown. The bulk of HO-gauge track and its components is made to conform to this first method of operation. Several types of track have firmly established themselves, among which are the Mantua, the Varney, the Midlin and the Walthers, with many others. Mantua track has a fibrous web sleeper-section which is ingeniously clipped to the rail so as to permit the shaping of curves to any radius when the track is made. Midlin track is excellent, being shown in the diagram of the crossover (Fig. 286). It uses special rail with a barbed projection on the underside, which fits into a shaped slot in the sleepers. No spiking is required, and no battens. The slots may be seen in the drawing. The sleepers are separate and of wood. Varney track consists of rail of the common order which attaches to a form of wooden roadbed on which the sleepers are beautifully milled out, a slightly raised ridge being provided so that no gauging is required. Walthers track uses the same fibre sleeper-section as Mantua, but the plain rail is spiked down in the ordinary way. All these types, and many others—one of which has a rubber roadbed for silence—are to be commended, though to the writer the Midlin seems to have the best future. After the war, there will probably be vast importations of these forms of track both for British and American modelling, and agencies are already being

negotiated. Needless to state, fully built up switch-schemes may be had, as well as kits.

The standard dimensions for HO-gauge, as stipulated by the authorities, are shown in Fig. 287, while in Fig. 288 will be found drawings (*Model Railroader*), giving details of the actual railroad standards in construction, permanent way, ballasting and in spacing signals. A group of typical American way-signs is also shown (Fig. 289); these vary considerably with their localities. As a guide to American methods in track-planning, I also include two typical layout schemes, that of the West Los Angeles Club in HO-gauge, Fig. 290, and that of the private system known as the Western Lines, in O-gauge. For this layout a little over half the space only would be required to suit HO-gauge (Fig. 291).

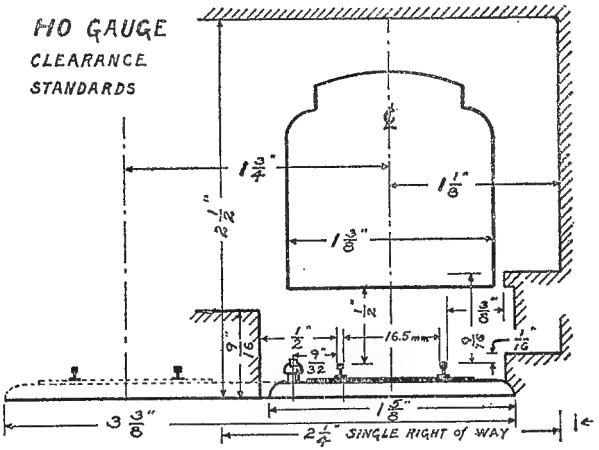


Fig. 287.

American freight cars have a charm of their own and vary in design exceedingly —much more than is commonly appreciated by the British onlooker. There are fully as many types of construction as on our own systems. Almost exclusively consisting of bogie stock, the range of selection comprises box-cars for merchandise, automobile cars, furniture-, poultry-, live-stock cars, open gondola cars, well-cars for special loads, an enormous range of hopper cars for coal and iron ore, work-cars, dump-cars, and cabooses. A typical box-car is shown in Fig. 294, and is produced full size. An end view is given in Fig. 295. It may form a type for many other designs, though these vary greatly even in the design of the roof-eaves as well as the doors, under-structures and sides. A Varney caboose, the drawings having been taken from a kit-sheet, is also shown to full size in Figs. 292 and 293. The method here for construction is to use sides of pressed shim-brass, which are sent out ready embossed and cut, the actual rivets and seams being clearly shown.

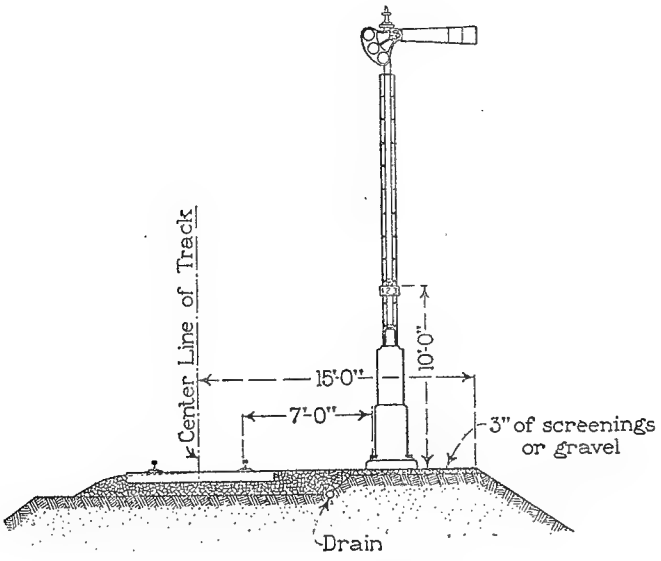
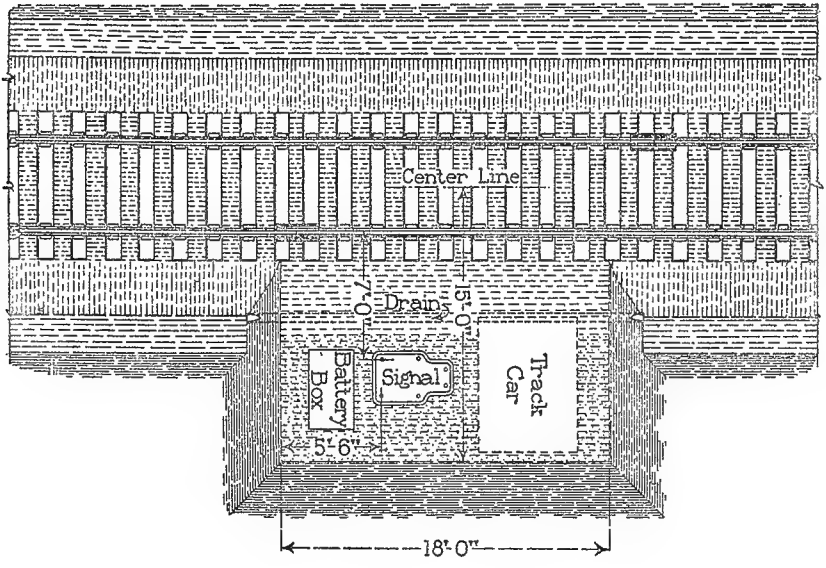


Fig. 288.—Standard P.W. and signal distances.



These sides are built, as indicated, around a wooden framework. Other types similarly treated are offset-sided hopper-cars and all-steel box-cars. There are literally scores of freight car kits to be had from innumerable firms, all of them resplendent in their attractive colours, the range of selection for refrigerators alone being enormous. Trucks are sold, usually, as a matter of course insulated for two-rail operation. Separate parts, complete kits and completed freight cars may be bought at extremely reasonable prices. Usually there are five main parts to the body, all accurately cut to shape, with lithos (or " printed sides ") provided. Some of Varney's car sides are lovely die castings in plastic similar to bakelite.

The range of choice in passenger cars is certainly not so extensive as that for freight stock, but the types that are offered are, perhaps, better than the freight cars in quality. Walther's passenger coaches are produced in a variety of finishes, ranging from day-cars to Pullmans. Varney also has a splendid series of

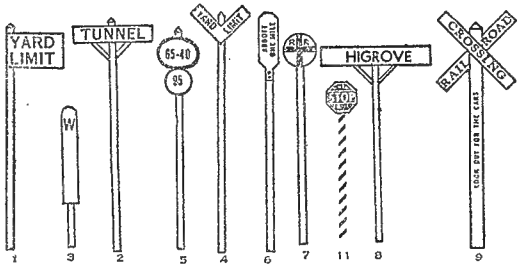


Fig. 289.

the latter, the sides being produced by a process of lithography on celluloid of a fairly thick calibre, the colouring and gold-lining being most attractively done. Another very good range is put out by the Model Railroad Shop. Four-wheel and six-wheel trucks are also to be had in profusion. The Varney kits for passenger cars are the only kind the author has seen that are produced ready-lettered. Components as well as kits are plentiful.

When we come to locomotives we find that the firms have been marvellously enterprising. Popular amongst finished models at a reasonable price are those of Varney, of Chicago. This firm has been engaged upon war-production, but has large schemes for post-war years. Their series of engines is complete to the last item—a magnificent Pacific, a Consolidation freight, a Mikado, a switcher, an electric passenger type, and, most remarkable among all HO-gauge models, a Yellowstone Mallet of the 2-8-8-4 wheel arrangement. On the first two engines the driving wheels are sprung individually, and all the mechanisms are excellent. Varney also has a fine little dockside saddle-tank engine in this scale, the body being an aluminium casting, similar to the white metal Reidmere body casting.

Mantua also have a fine Pacific, and a Consolidation, of which a photo is given, as well as a very attractive 4-4-0 historic model of the 1880 vintage, and a Mogul freighter and camel-back switcher. Mr. George Stock, of Philadelphia, is also in the market with excellent examples, a magnificent piece of his work—a Pennsylvania K-4—being shown herewith. It may be noted that the scale of this model is smaller than that of HO-gauge.

Popular also are the mass-produced but good locomotives of Gilbert and of Lionel, the former an HO-gauge type for two-rail operation, the latter suited for the American OO-gauge. The Gilbert Company's engine is a Hudson type.

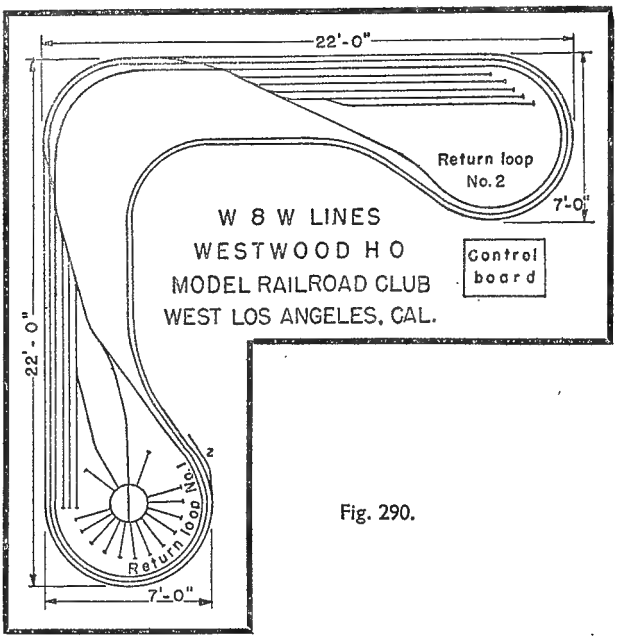


Fig. 290.

Not only are finished engines and complete building kits offered, but Varney and Mantua have extensive and complete ranges of finished components, many of which are illustrated. The range of locomotive and tender trucks is legion. It includes Commonwealth six-wheel trucks, as well as the usual four-wheel special types. A photo of one of Walthers' fine engines—a Mikado—is furnished.

Strangely enough, with all this concentration upon rolling stock and locomotive power, there has been comparatively little enterprise in building construction. There is one firm, Model Structures Co., of Santa Cruz, who specialise in nothing else but O-gauge buildings and kits for the same, and their work is the most excellent

that the world can show. A typical O-gauge model of a suburban station by this house is depicted in a photo, and they promise to launch out into HO-gauge later on. Indeed, long before the war they were carrying out large experiments with this standard, and some years ago sent to the author a collection of photos of projected models. A roundhouse, on the style of the one shown in the photos—which show a test-model half completed—is included in the scheme. This firm also produces magnificent building components for O-gauge, very many of which are perfectly suited to HO-gauge work. Notable among these are the pressed roof board, the stripwood channels, the smaller type embossed windows, and so forth. They also plan to put on the market similar bridges and viaducts for HO-gauge as those already provided by them for O-gauge. Other firms also have already put out HO-gauge examples of these, as distinct from actual buildings, and their products include trestles, turntables, plate bridges and so forth.

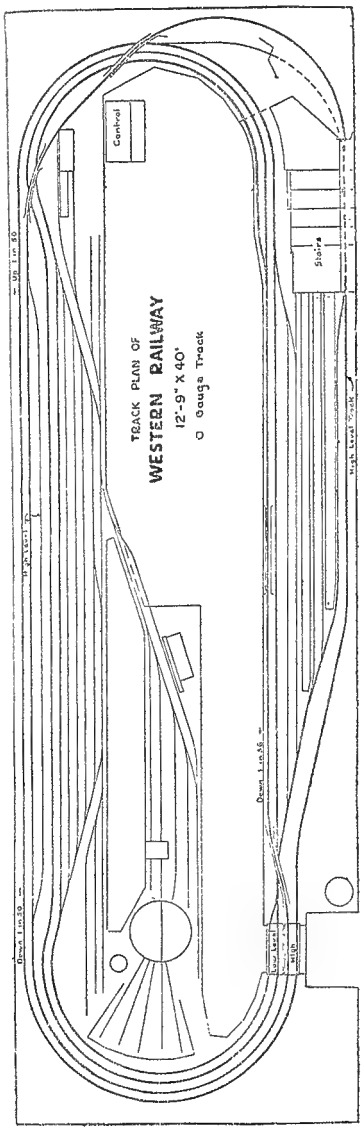


Fig. 291.

But happily enough, the work of building construction, given the correct designs to work from, is as easy here as anywhere. The worker's best method is to obtain outline drawings, or, if he is sufficiently skilled, to work from photos. The dimensions of three common types of modern coaling stage as used in the United States are given in Fig. 296. In times of peace the American firms who erect railroad buildings, as well as the railroad companies themselves, are lavish in their willingness to provide information to prospective and enthusiastic artists.

Signalling has had generous consideration, though much of the activity in pre-war days was not able to go beyond O-gauge. The light signals by Walthers,

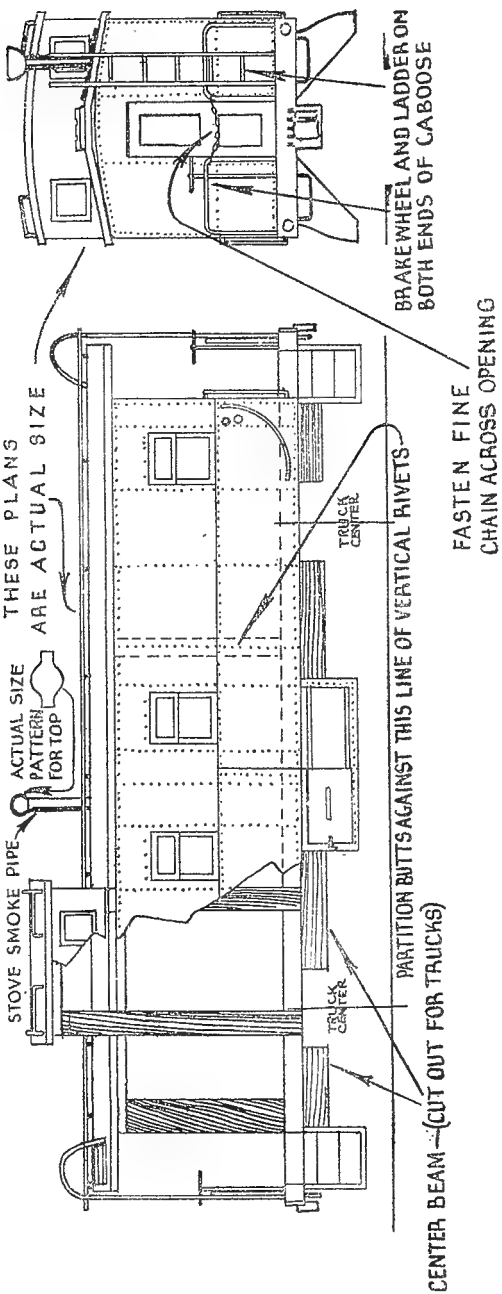


Fig. 292.—Varney metal-sided caboose. (Full size HO-gauge.)

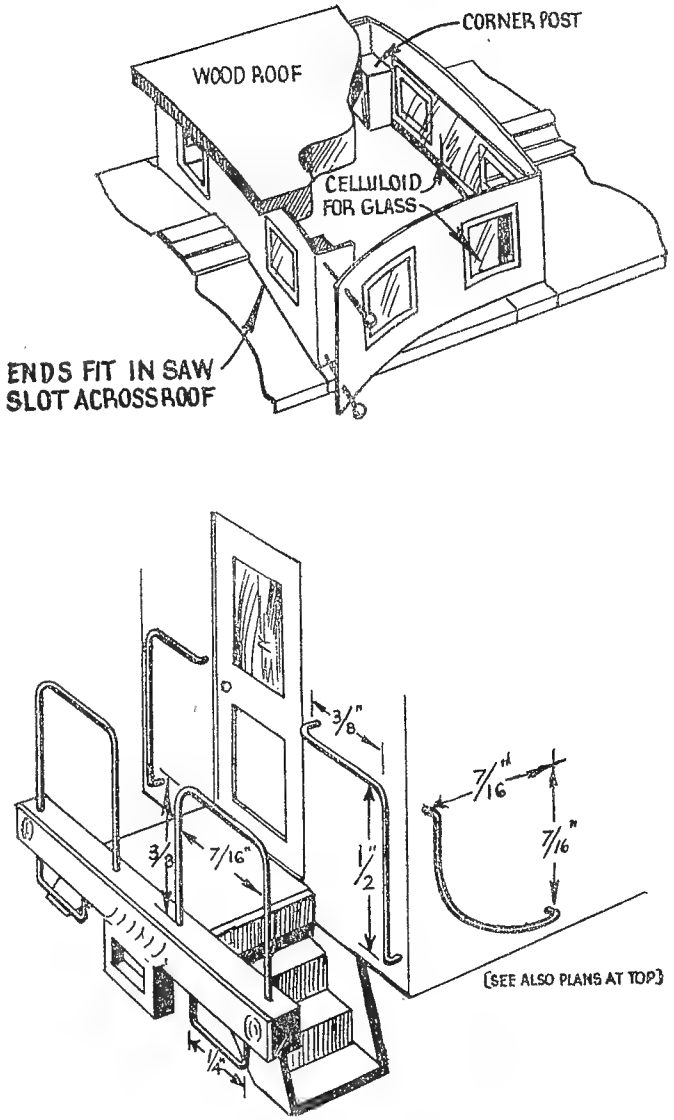


Fig. 293. Further details of the Varney caboose.

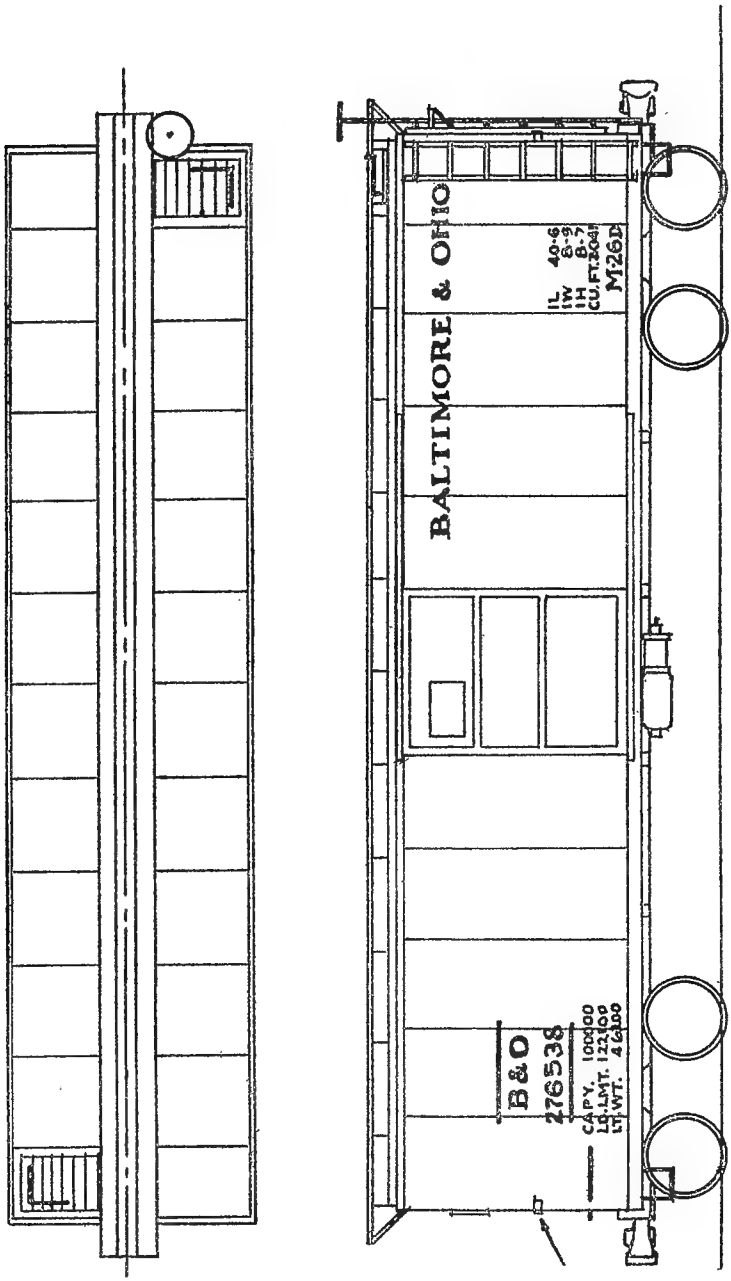


Fig. 294.—Standard HO-gauge box car.

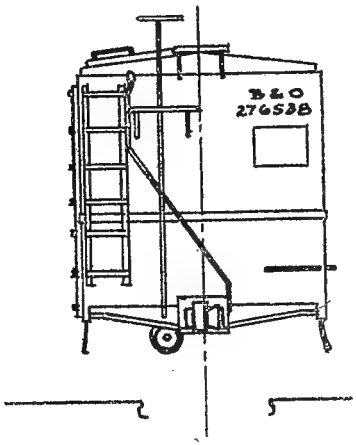


Fig. 295.

Fig. 297, will be later produced in 3.5-mm. scale. Also excellent O-gauge "signal bridges" now obtainable, which, incidentally, will make splendid foundations for normal British signal gantries. The scheme of signalling favoured in America among modellers, though the standard semaphore practice has its ardent devotees is that of track-circuiting in conjunction with position-lights. A method has recently been evolved for overcoming the difficulty of adopting this practice with two-rail. For the operation of electric points with remote control there is more than ample provision—some of the first and the best point-machines came from America. Varney, Walthers, Mantua and numerous other firms have their advocated types. Automatic couplers and uncouplers are even less neglected than they are over here ; the best uncoupler in the writer's opinion is that of Walthers, for it is a robust machine, almost invisible and absolutely efficient.

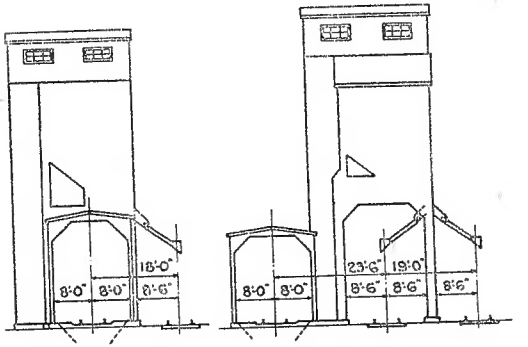
American scenery has a charm and force of its own. The American fraternity are wedded to the idea of building up the scenery of a layout around the trackbed itself, discarding the notion of a flat-surfaced baseboard. I am not sure, though I have been slow to admit it, that this is not the method with the future before it. At all events, the best photographs of scenery on layouts have come recently from across the Atlantic. The method is to use a plastic cement of convenient composition, laid moist on an undulating surface of screen-wire, which is shaped to the proper form before applying the plaster. Trimming and colouring are done while drying is in process, and after it is completed. It is strange that in America, a land of trees, there are no model trees like ours. But these will come.

Aside altogether from the idea of modelling strictly to American practice, it has been sufficiently indicated here that there is a vast range of accessories at the disposal

of the British modeller who adheres carefully to home procedure. Turntables, roundhouses, tanks, bogies, boiler fittings, wheels, mechanisms, materials, windows, roofing materials, point-machines, and scores of other oddments, come under the eye of the investigator, and fire his imagination, at once.

. . . . .

Here we reach the end of our task. We have arrived at the limit of our space with a sense of having—even though dealing exclusively with one gauge-standard —left very many things unsaid. The difficulty at every point has been to decide what to exclude, so wide is the theme and so absorbing the interest. Two tasks remain. One is to wish the beginner the best of good fortune in his planning and building. The other is to offer sincere thanks to all who, recently and in past years, have given their support to the author in the pleasant labour of making and revising this book. To name these helpers separately would be hopeless—they are too many in number ; but a glance through these pages will reveal their identity, and that is perhaps the testimonial they would prefer.



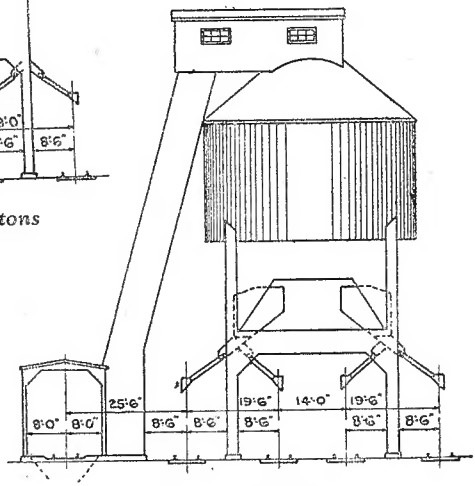


Fig. 296.—Actual coaling stage standards.

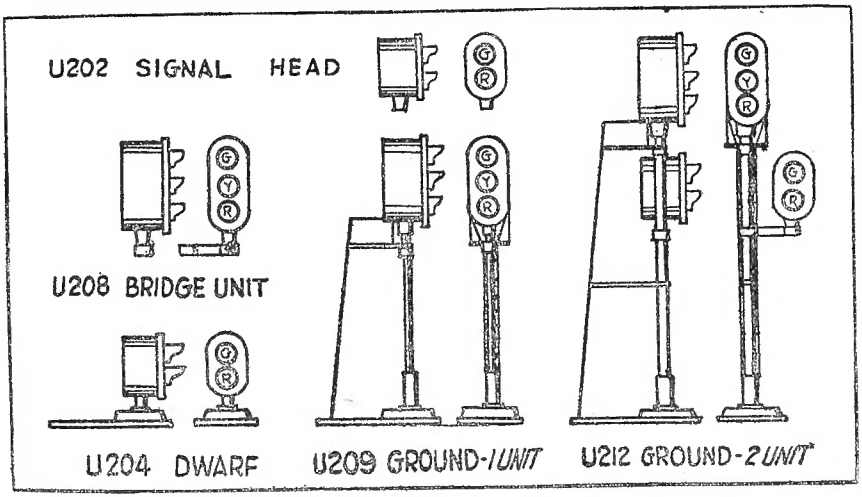


Fig. 297.—Walther's light signals.

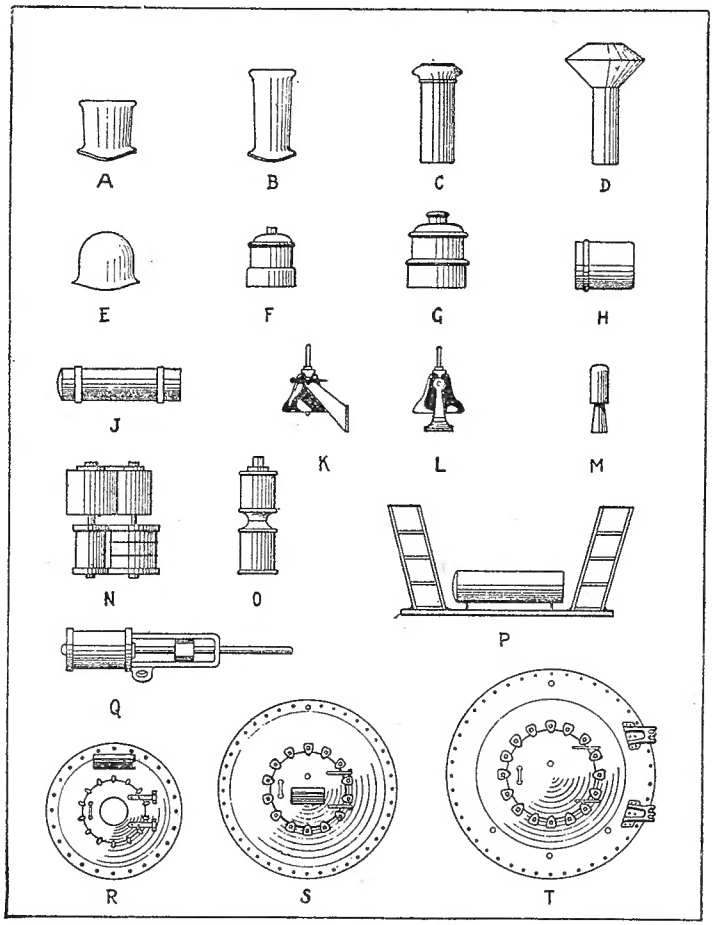


Fig. 298. Locomotive components by Mantua.

Fig. 299. Two Varney trucks.

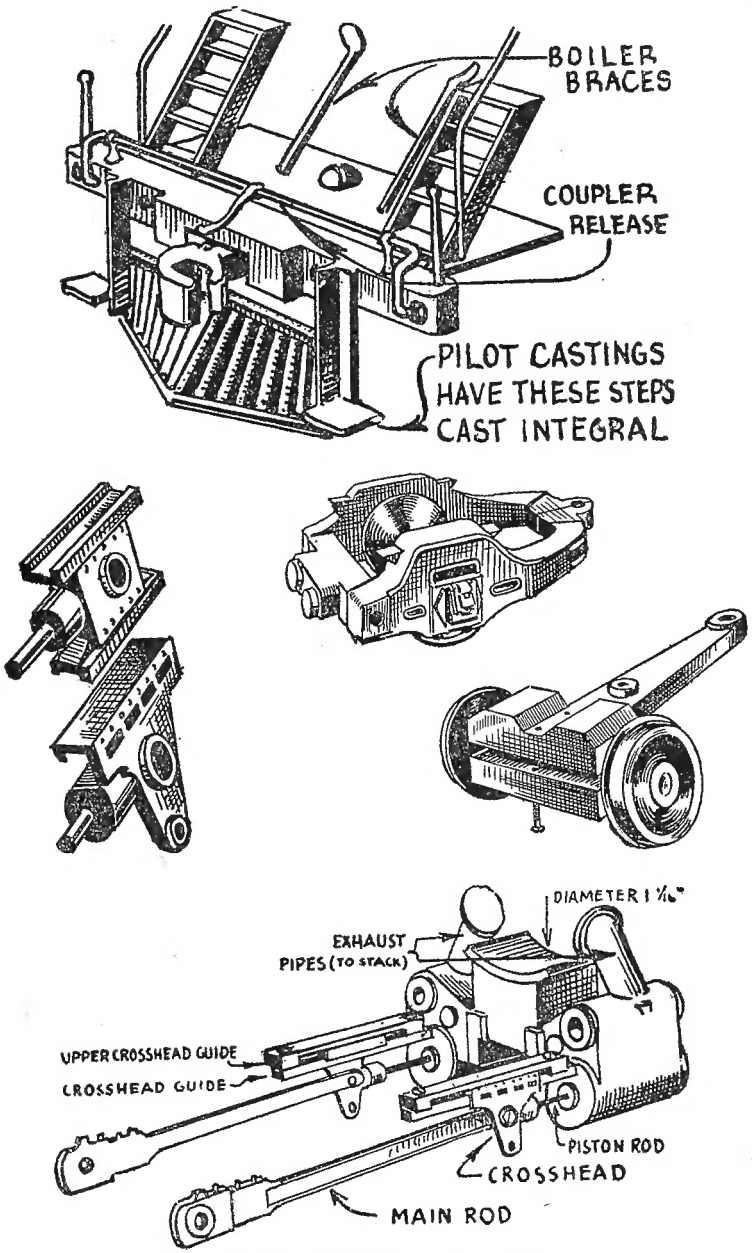


Fig. 300. Varney locomotive parts.

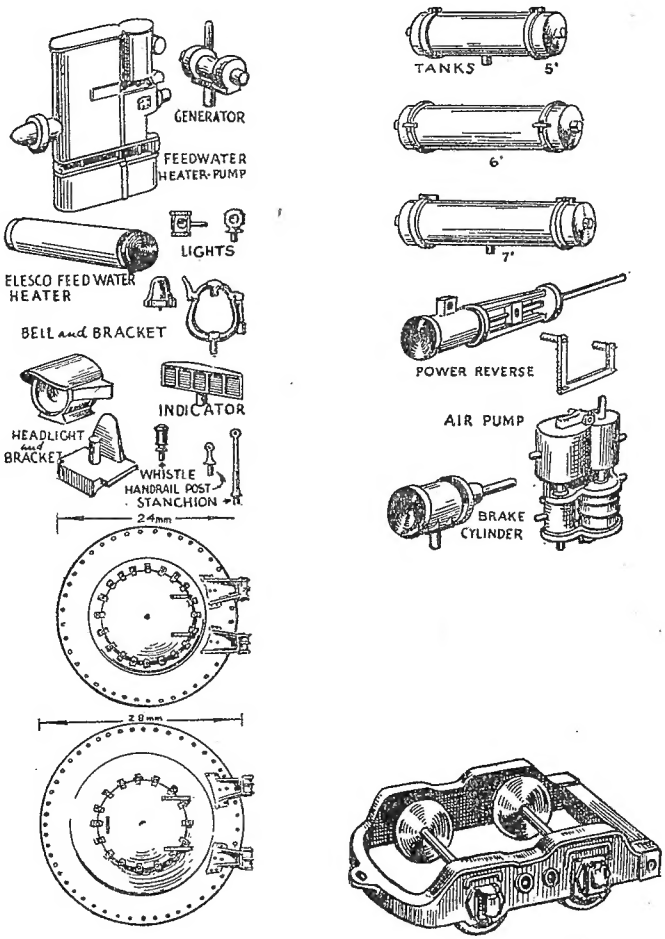


Fig. 301. Varney locomotive parts.